

# CRANE Cams®



## MASTER CATALOG

CAMSHAFTS • VALVE TRAIN • IGNITION

[www.cranecams.com](http://www.cranecams.com)

# Cams...from Beginning to End!



## **Genuine Crane 8620 and 9310 Steel Billet Cams... The Strongest Available!**

Our famous carburized roller cams begin as 8620 or 9310 alloy steel billet bar stock. Each cam then undergoes numerous precision manufacturing operations required to produce a finished cam. You can identify a genuine Crane cam core by the distinctive copper plating between the lobes! Crane 8620 and 9310 steel billet cam cores are used by prominent racers, engine builders, and manufacturers.

## **Lobe-To-Lobe, Cam-To-Cam Accuracy!**

**Only** Crane Cams delivers that famous Crane **lobe-to-lobe, cam-to-cam accuracy** that engine builders trust! Crane Cams are always **measurably more accurate** because we begin with the industry's most accurate tooling and end with the industry's most accurate manufacturing... **all performed in-house**, by Crane!



## **Roller Cam Power With Hydraulic Cam Convenience!**

The world's finest, strongest, most durable **carburized** and **induction hardened** steel billet cams and the proven power making capabilities of Crane Cams' **hydraulic roller** lobe profiles produce roller cam power with the easy maintenance of a standard hydraulic cam!

## **The World's Most Powerful Cam Profiles For All- Out Racing!**

For more than 55 years Crane Cams have powered **winners** and **broken records!** Crane-pioneered **dual-pattern** cam lobe profiles first appeared in the 1960's, and are today's primary component in shattering drag racing's 330 mph Top Fuel barrier and the Pro/Stock 200 mph barrier! When records fall, Crane Cams make it happen!



## About the Catalog

This catalog is organized into three separate sections. First is the Cam & Valve Train Application pages which includes all the necessary information needed to choose the right camshaft for your needs. Next is the Cam & Valve Train Buyer's Guide. The Buyer's Guide contains additional product applications and additional information not found on the regular applications pages. The final section is the Ignition and Ignition Buyer's Guide pages.

Each product section is organized in alphabetical order, and in "Make, number of cylinders, year, engine" fashion. Cam & Valve Train Applications are organized in alphabetical order, by engine make. Cam profiles ("grinds") are listed beginning with the "mildest" duration (lowest numerical duration shown at .050" cam lobe lift) through the "wildest" duration figures.

A camshaft Quick Reference Guide precedes the Cam & Valve Train Applications section. This is a listing with basic specifications of all the camshaft grinds that appear in this catalog. This provides a condensed version of the complete camshaft specification listings that appear on each page of the Engine Application section that follows.

### Catalog Sections - Pages

Camshaft Quick Reference Guide - Pages 18-39

Cam & Valve Train Applications - Pages 40-283

Valve Train Buyer's Guide - Pages 284-371

Ignition - Pages 386-419

### Choosing The Correct Cam

All Crane Cams are organized in typical "Make, number of cylinders, year, engine" fashion, and according to the type of lifter used... **Hydraulic, Hydraulic Roller, Mechanical** (Sometimes called "solid" or "flat tappet"), and **Mechanical Roller**. Cam profiles ("grinds") are listed beginning with the mildest duration through the most radical in each lifter type.

Each left page begins with the **Application** column. This column gives basic application information. In the next column is the **Cam Series** and **Grind Number**. Next is the **RPM Power Range**, and then the cam **Part Number**. "Cam Only" cams usually have a suffix (last) digit "1" in the part number. Cam & Lifter Kits usually have a "2" digit suffix. Application provides additional information about the camshaft. If the idle quality is other than stock, it is also noted in this column. **Cam specs data** such as **valve lift, duration** and **lobe separation** is shown at the far-right of each cam listing. To choose a street performance cam refer to "**Choosing The Right Cam**", and "**Getting Information**", found on pages 13 and 14-15. Note the part number of the cam you select.

For the latest **all-out race cam profiles** or **custom grind services** contact us at: **866-388-5120, FAX: 386-236-9983**. Our hours are normal business hours Monday - Friday, Eastern Daylight Time.

### Choose the correct valve train components

You can find these by reading right, across the page. For detailed info and applications on **Valve Train Components** see the **Buyers Guide** section, pages 284-371.

### Choosing The Correct Ignition

Beginning on page 386 is the Ignition section where you will find all of the technical information needed to choose the correct Ignition components for your application.

## Product Emissions Codes

### Product Emissions Codes For California Air Resources Board (CARB) Regulations

The product Emissions Code is designed to aid in determining the correct application of emissions related motor vehicle components. Please use our Master Catalog to be sure that purchases comply with all emission laws.



Green

Product bearing this product identification code has been granted a California Air Resources Board (CARB) exemption ("EO" number), or is a direct or consolidated replacement part. It is 50-state legal, per the manufacturer's application guide.



Blue

The manufacturer of the product bearing this identification code represents that it has not been found, nor is it believed to be, unlawful for use under provisions of the Clean Air Act, per the manufacturer's application guidelines. This product is not legal for sale or use in the State of California (or in states which have adopted California emission standards) except on pre-emission-controlled vehicles/motor vehicle engines (pre-1966 model years).



Amber

Products bearing this product identification code are legal only for off-highway use (except CA or states that have standards), or pre-emissions controlled engines (pre-1966 domestic vehicles certified to CA standards, pre-1968 domestic vehicles certified to federal standards and all pre-1968 foreign vehicles), per the manufacturer's application guide.

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# Crane Cams History

## Crane Cams History



Crane Cams was originally known as known as "Crane Engineering Company, Inc.", and was founded in 1953. In 1970 the original name, "Crane Engineering", was shortened to "Crane Cams, Incorporated", better defining the company's products and market of that era.

From that very humble beginning,



Crane Cams has evolved into a manufacturing and marketing company. Amazingly, it all began in an unused corner of the company owned by the founder's father's machine shop.

The founder, a young apprentice machinist, became interested in "soup-ing-up" his flathead Ford V-8 hot rod. Like most others, he was strongly influenced by the various "hot rodding" magazines, ordering his first cam from a California cam company's ad. The founder's machinist's training and hot-rodder's ingenuity had already taught him that camshaft design and accuracy exacts a critical effect on engine power. He also knew he was easily capable of designing and manufacturing camshafts. What's more, he knew he could design more powerful, far more accurate and repeatable camshafts.

Although money was scarce, the young apprentice traded his way into a well-used cylindrical grinder. In rebuilding this old, used machine he quickly developed cam manufacturing and

design knowledge. His initial "home made" cams were accurately made and surprisingly more powerful than anything he'd previously purchased. Other local hot rodders soon found out, and began buying his camshafts. The reputation of the backroom Crane cam company spread quickly across Florida and further into the Southeast. In response, Crane Engineering Company was founded, which was an impressive name for a tiny yet highly ambitious firm.

By the mid-1950's the flathead Ford and early overhead-valve Oldsmobile and Cadillac V-8's were replaced by the powerful, compact Chevrolet 265-283 V-8 engine family. It seemed that with the early small-block Chevys came a surge of growth for all forms of auto racing. Drag strips and oval tracks suddenly appeared, not only across Florida, but the nation, and the tiny backroom cam company grew as well.

In 1960, a Georgia Tech University engineering student and weekend drag racer, Pete Robinson, bought a Crane cam for his supercharged Buick powered 1940 Ford. After success on the street and at the drags, Robinson sold the '40 and bought a dragster chassis from the Dragmaster Chassis company, in California. Pete carefully assembled a stroker crankshaft, supercharged, small-block Chevy, and installed a Crane roller cam. Robinson's new car ran well on Atlanta area tracks and at a few NHRA Division 2 events. On a whim, he entered the "Southwind" dragster into the field at the 1961 NHRA Nationals, an event that had previously been dominated by California based cars and drivers.

A virtual unknown, Robinson's little single-engine dragster shocked the race field and the nation, winning Top Eliminator and smashing records in a major upset. Several other Crane-

cammed racers were also successful, but it was "Sneaky Pete" Robinson and Crane Cams that suddenly captured the racing world's imagination!

Soon, word of the amazing power produced by Crane Cams reached circle track racers. This reputation attracted a number of racers and engine builders including: A.J. Foyt, Red Farmer, The Wood Brothers, Bud Moore, Bill Elliott, Junior Johnson, Dale Earnhardt, Richard Petty, Darrell Waltrip, Bobby Allison, Donnie Allison, Cale Yarborough, and David Pearson, all using Crane Cams and winning heat and feature circle track races across the South.

Crane Cams prospered greatly during the "car culture" years of the 1960's, and soon outgrew the building where the founder's father had once operated his own machine shop. In 1965, Crane Engineering purchased property and began construction on a brand new building. The firm moved into its brand new facilities in January of 1966, allowing an expansion of its product line and services. Soon Crane introduced its hallmark, gold-anodized, full-roller aluminum rockers, was granted a U.S. Patent on a brand new roller lifter



## Crane Cams History (continued)



design, began selling mass-produced, custom-ported, all-out racing cylinder heads, heat treated chromemoly push-rods, aluminum, steel and titanium valve spring retainers, machined steel valve locks, high-rev kits, and stud girdles. Crane's rapidly expanding product line was chocked full of unique and innovative items, all engineered to boost horsepower and reliability in race engines as well as street performance applications. That plus the huge success that Crane cammed racers were enjoying firmly established Crane as the industry's No. 1 cam company.

It was also during this time Crane Cams became a pioneer in the science of computerized cam lobe design. Previously, cam profile designs required lengthy, tedious mathematical exercises with a slide rule or mechanical calculator. Computer technology slashed this time and substantially increased lobe accuracy. For Crane Cams, the result was an explosion of knowledge gathered, expanded and utilized. Computerization of the science of cam lobe profile design also enabled Crane's design staff to explore new possibilities in cam and valve train function. Each day brought new innovations and a tremendous amount of data that could all be applied to the design and manufacture of new, even more powerful camshafts!

As Detroit accelerated and expanded its motorsports programs, Crane Cams was tapped as a provider of cam design knowledge as well as becoming a trusted supplier to the automotive industry. Ford, American Motors and Chrysler all selected Crane Cams as their choice for a variety of racing and street performance related products and services.

For many years Crane had purchased its steel cam cores from Universal Camshaft Company, of Muskegon, Michigan. When that company became available in 1975, Crane acquired it, thereby providing itself with a stable, long-term source for steel cam cores. That operation was moved in 1981 to a newly constructed manufacturing center in Daytona Beach. In 1985 the entire company left its founding city, Hallandale, Florida, and relocated

to Daytona Beach.

In February, 1994, Crane Cams acquired Camshaft Machine Company and its plants in Michigan and Indiana. To better reflect its new market mix, the company's name was changed to Crane Technologies Group, Inc.

Seeking to return to its core cam and valve train business and its roots in the performance market, Crane sold Camshaft Machine to Federal-Mogul Corp. in early 1999.

In 1989 Crane Cams recognized the potential for performance camshafts, valve train components, ignitions and electronics for the rapidly growing Harley-Davidson motorcycle market. Today, Crane Cams, Crane valve train products and Crane FireBall ignitions are among the industry's most popular for cruising, street performance and racing. Crane is also an annual participant in many of the world's largest motorcycle gatherings.

Crane Cams entered the world of electronic ignitions by acquiring Allison Electronics in 1990. The original product line was completely reengineered, updated and expanded and is now marketed as Crane FireBall Ignitions. FireBall ignitions have since become the industry's most technologically advanced for racing and street applications. Other products include FireBall engine controls and FireWire, a premium quality, double silicone jacketed, reactive-core line of race-proven spark plug wires.

Also, Crane's optical trigger/fiber optics distributor is approved for competition by NASCAR and used by many leading teams. Likewise, Crane ignitions are employed by top runners in ARCA, ASA, USAR and other sanctioned series. Crane's billet distributors, ignitions, coils and FireWire® spark plug wire are available for many drag racing applications. In 2009, Crane Cams was purchased by George and Ken Smith. George is well known in NHRA circles for the design and introduction of the S&S-powered Buells that have become a dominant force in the Pro Stock Motorcycle class and won the 2009 NHRA Full Throttle Points Championship for Hector Arana. Given the resources of the company's new ownership, Crane Cams now has an expanded amount of state-of-the-art manufacturing firepower and R&D at its beck and call. This includes a substantial number of the latest CNC machining centers (including automated pallet changing), the ability to produce fully

digitized camshafts using Landis CNC equipment, as well as grinding cams via traditional methods using production masters, dyno cells, Spintrons and a fully government-certified emissions lab. Quality control is aided by state-of-the-art testing equipment such as Zeiss optical and Adcole computerized devices, along with a dedicated staff that has helped to maintain the industry's highest standards since "day one."

New facilities have been set up in Daytona Beach, with a large number of veteran Crane Cams employees continuing in their technical and manufacturing capacities. The engineering staff utilizes the latest in design and analytical software to continue the company tradition of developing the best possible components for each application.

Customers can be secure in the knowledge that given George Smith's racing background (which includes studying camshaft and valve train technology under the tutelage of Harvey Crane) and penchant for perfection, the company will strive to lead the industry in quality and performance while improving product availability to levels that racers require.

With the industry's largest camshaft database, which exceeds 80,000 profiles, an impressive manufacturing capability, and an experienced tech staff ready to provide racers with race-winning valve train and ignition components.

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# Crane Camshaft Series

## *Crane Camshaft Series*

### **Blueprint™ Cams For Musclicars**

Crane Blueprint™ musclicar cams are duplicates of popular original equipment musclicar cams from the 60's and 70's. These hydraulic and mechanical cams are computer smoothed for added performance and increased valve train life. They are an excellent choice for a true musclicar restoration where engine authenticity, correct idle quality and detail are critical to the restoration. This catalog lists our most popular Blueprint grinds, but many more are available on request. We have an extensive library of profiles, enabling us to match the correct year and horsepower, or factory part number, camshaft for your specific requirements.

We also provide regrinding services for the restoration of older and antique camshafts, when outright cam cores are no longer available. Contact a Crane Technical Service representative at: 866-388-5120, FAX 386-236-9983.

### **Energizer™ Hydraulic**

Energizer street performance cams are produce sizeable torque, HP, and RPM increases at an affordable price. Energizer cams use the same computer techniques and software that developed the world's fastest and quickest cams. These single-pattern cams have tighter lobe separations, for added torque, mid-range power, throttle response and that popular lumpy idle for non-computer controlled V-8 engines. They are available as camshaft and lifter kits, or as a camshaft only.

### **Emissions Legal-Computer Compatible**

Crane emissions legal comshafts produce amazing increases in torque, horsepower, and throttle response while extending the rpm powerband of computer controlled performance passenger cars, 2x4 and 4x4 light trucks. Emissions legal comshafts also permit full function of stock engine control computers. Emissions legal comshafts also work well with performance "chips." Emissions legal camshaft profiles are available in both standard "flat-faced" hydraulic lifter cast-billet designs as well as Hydraulic Roller designs. Crane Emissions legal comshafts are available for GM, Ford, and Dodge Magnum® V-8 engines as well as selected GM V-6 engines.

### **Hydraulic, Hydraulic Roller, Mechanical Non-Roller and Mechanical Roller Cams**

Most cams feature a dual-pattern lobe design, for optimum intake/exhaust flow, maximum low-end, mid-range and upper rpm power. Hydraulic cams begin at 248° advertised duration (192°/204° @ .050"), .400/.427" valve lift, up through 312°/319° advertised duration (262°/270° @ .050") and .636" valve lift. Many are designed to maximize the effects of power enhancing systems such as nitrous-oxide, superchargers, and turbochargers.

Whenever practical, the lobes are optimized to take full advantage of the maximum flat-faced lifter diameter of each engine family (such as .842" for most GM, .875" for Ford, and .904" for AMC/Jeep and Chrysler). This produces the best powerband without sacrificing durability, idle quality, and responsiveness. These include Crane Cams' Hydraulic Roller and Street-Roller mechanical roller cams.

## *Crane Camshaft Series (continued)*

### **Hydraulic Roller Cams**

Crane Hydraulic Roller cams offer the sizeable power and torque increases that are available only with roller cams, plus the low-maintenance convenience of a hydraulic cam. Hydraulic Roller cams are available for retrofit (converting earlier non-hydraulic roller cam engines), and to increase power output of engines already equipped with hydraulic roller cams. Crane Hydraulic Roller cams are produced using our own industry standard, steel billet cam cores, carburized or induction-hardened for strength and wear resistance. Hydraulic Roller cams are available as catalogued plus custom grind lobe availability.

### **Street-Roller Mechanical Roller Cams**

Street-Roller cams are available in a variety of profiles, ground on our famous steel billet cam cores and fitted with iron distributor drive gears (where applicable). Street-Roller cam lobe profiles feature exclusive lobe ramp designs that minimize valve train noise and increase valve train durability for street driving engine applications. Street-Roller profiles are also available for nitrous-oxide systems, superchargers, and turbochargers, offering even greater horsepower and torque output for these power enhancing systems.

### **Saturday Night Special™ Cams For Circle Track And Drag Racing**

Crane Saturday Night Specials are hydraulic and mechanical lifter cam, lifter, and valve spring kits, primarily developed for rules-limited oval track racing and ET-Bracket drag racing applications. For oval track racing they produce maximum off-the-corner torque, with strong upper-rpm horsepower to pull the straightaways. For drag racing they produce maximum torque, for starting line launch and the upper rpm power to pull through the gears. Saturday Night Special cams are available for Small-block and Big-block Chevy; 289-302-351W Ford; and 429-460 Ford V-8's. (For circle track racing we also offer many other profiles for specific track cam rules not covered by Saturday Night Specials. Contact Crane Technical Services for details. 866-388-5120).

### **Crane Racing Cams For All-Out Competition**

Crane pioneered the use of computers for lobe profile design and dual-pattern cam profiles. With over 80,000 grind numbers in our cam library, we've designed and produced cams for drag racing, circle track, road racing, boat racing, 4x4 off-road, mud racing, truck and tractor pulling, even airboats and swamp buggies. Some of our most popular racing profiles are listed in this catalog. We also custom design and grind cams for specific race engine needs. For more information contact a Crane Technical Service rep at: 866-388-5120, FAX: 386-236-9983.

# Crane Cams & Valve Train Products Section

## *How the Cam and Valve Train Section is Organized*

- Crane Cam & Valve Train Applications catalog pages are organized by "**Make, Number of Cylinders, Year, Engine**" fashion .
- After locating your desired "**Engine**" comes the **type of lifter** the camshaft is designed for. These begin with Standard flat-face Hydraulic Lifters, then Hydraulic Rollers, then Mechanical flat-face Lifters (also called Solids or Flat Tappets), and Mechanical Roller Lifters.
- Important information on each left-hand page is arranged in columns.
- **Application**  
This column describes the basic usage that each cam is intended for, along with any pertinent advised component items to produce the best results.
- **Camshaft Series and Grind Number**  
Identifies the cam *series* and the cam *grind number*. (Grind Number is different from the cam Part Number. To order, always use the cam Part Number.)
- **RPM Power Range**  
States the RPM range at which the cam produces **maximum torque and horsepower** (The engine will typically rev 500-1,000 RPM above the stated RPM Power Range but not at peak power levels)
- **Camshaft Part Number/Emissions Code**  
Identifies the actual Part Number for this camshaft. Cams sold as Cam Only (without lifters) usually end with the numeral 1. Cam & Lifter Kits include matching Crane lifters. Their Part Numbers usually end in the numeral 2. The "Emissions Code" states the California (CARB) emissions designation for that particular cam.
- **Lifters**  
These are the lifters recommended for best durability and performance for each camshaft. Upgrade options are also conveniently listed.
- **Complete Cam Specifications**  
Under this bar you'll find all of the cam's critical specifications. These include: Degrees Duration @ .050"; Advertised Degrees Duration; Degrees Lobe Separation; Open/Close @ .050 Cam Lift; Lash Hot; and Gross Lift.
- **Cam Facts and Notes**  
More helpful information on the correct application of this cam as related to the specific engine. Also provides helpful hints to insure proper camshaft and component application and installation.
- **Right Page: Matched Valve Train Products**  
Provides part numbers for related valve train components and refers to the catalog page of the **Buyer's Guide** catalog section where more detailed information on the recommended valve train components and the wide range of optional Valve Train Components we offer are located.

### Basic Tips on Choosing the Right Cam

Cam selection accuracy begins with knowing how you intend to use the vehicle, engine and drivetrain modifications already made or planned, and the lifter type (Hydraulic, Hyd. Roller, Mechanical ("Solid" or "Flat Tappet"), or Mech. Roller you wish to use. You'll find additional information to help you choose the correct cam on **Pages 14 through 17**. We urge you to take a little extra time now in making your selection. This will insure that you make the right choice, the first time! To choose the correct cam and valve train for your engine, vehicle and application follow the steps below:

#### What To Look For First:

First, find your **engine make, number of cylinders, year, and original engine displacement** as listed in cubic inches or metric reference. (Example: Chevrolet, 1986, 350 cu. in.)

#### Decide Which Lifter Style:

Decide on the **lifter type** you wish to use in your engine. For convenience and ease of maintenance we recommend a hydraulic cam and lifters, either "flat-face" or hydraulic roller for most street performance and daily-driving applications.

**NOTE:** Passenger car engines up through 1987 model year generally used conventional hydraulic or mechanical (solid) lifters and cams. In the GM family 1988-up pass. car and 1996-up truck engines were factory equipped with hydraulic roller cams and lifters. (Light trucks (pick-up's, etc.) generally used flat-face lifters and cams up through 1995 model year.) We offer many different hydraulic roller cams, our exclusive Crane Cams hydraulic roller lifters (drop-in installation), correct-length pushrods and other valve train components for converting a flat-face lifter engine to the tremendous power benefits found with a Crane hydraulic roller cam. Look under **Hydraulic Roller Retrofit Cams** for specific engine details.

#### Determine Your Vehicle's 60 MPH Cruise RPM:

Determine your **Cruising RPM At 60 MPH** by reading Page 14 (Getting Information). Match your **Cruise RPM At 60 MPH** with the information found under **Application**. See the gear ratio/tire diameter chart on Page 15 to help you determine this RPM. Note: This is critical in making the right choice for a vehicle that is street driven. Be sure your information is accurate!

#### Choose Your Cam:

Use the **Cruise RPM At 60 MPH** numbers and match this RPM range with the **RPM Power Range** numbers shown on the left-hand page. Be sure to consult the **Application** info before you make your cam choice. Pay particular attention to the recommended engine **compression ratio**. Also, engines using aluminum cylinder heads dissipate heat more rapidly and can therefore use approximately  $+.75$  (three-quarters "point") compression ratio. (Example: Iron heads, 9.0:1 c/r; Alum. heads, 9.75:1 c/r) Remember: If you are in doubt, always choose **the next milder** cam profile. Be sure to specify the Part Number when ordering!

#### Choose Your Valve Train Components:

The **Valve Train Buyer's Guide (Pages 284 through 385)** contains **additional product applications and additional information** not found on the regular applications pages. Be sure to consult these pages for optional products that will add even more horsepower, torque, rpm, response and reliability to your cam selection.

# Crane Cams & Valve Train Products Section

## *Getting Information*

### **How to Determine Your Cruising RPM at 60 MPH**

1. Hold a constant 60 MPH and check the tachometer, if so equipped. You can also hook up a test-type tachometer, providing it has a sufficient RPM range.
2. Using the reference chart below, locate your tire diameter (height) and rear end ratio, then read the RPM indicated.

### **How to Determine Your True Rear Axle Ratio**

1. The actual ratio, or a reference code, will normally be found on either a tag attached to a bolt, or will be actually stamped into the axle housing. Your car dealer can tell you how your vehicle is marked.
2. Raise both rear wheels of the vehicle, with the transmission in neutral. Make sure that you support the vehicle with safety stands and block the front tires. Make a reference mark on the driveshaft and on the housing. Next, without rotating them, make a mark on both of the tires and the fenderwells. With a friend watching the driveshaft carefully, rotate both tires at the same time exactly one revolution. The number of turns the driveshaft makes indicates the ratio, i.e.,:  $3\frac{1}{2}$  turns = 3.5 to 1;  $2\frac{3}{4}$  turns = 2.75 to 1; etc. You can also use the above procedure the next time you have your vehicle lubed at the service station.
3. Many vehicles are equipped with overdrive-type transmissions. If this occurs, you must multiply your rear end ratio by the final transmission ratio. EXAMPLE: You have a 3.23 rear end ratio and a .85 high gear in the transmission:  $3.23 \times .85 = 2.75$  final drive ratio.

### **How to Determine Your Engine's Compression Ratio**

1. If your engine has stock-type pistons, and the original cylinder heads, you should be able to locate the compression ratio by:
  - A. Checking your owner's manual.
  - B. Checking a repair or service manual such as "Chiltons" or "Motors".
  - C. Call your car dealer's parts department with the engine description or serial number.
2. If your engine has non-stock pistons, refer to the piston manufacturer's catalog.

**NOTE:** If the cylinder heads are not stock, check to see if they have the same size combustion chambers. If not, refigure the compression ratio. Milling the block or heads also affects the compression ratio. Contact a Crane Performance Consultant for additional information.

## Getting Information (continued)

### RPM Shown at 60 MPH (Cruise RPM)

**RPM FORMULA:**  $\frac{\text{MPH} \times \text{Axle Ratio} \times 336}{\text{Tire Diameter}}$

| Rear End Ratio | Tire Diameter |      |      |      |      |      |      |      |      |      |      |      |
|----------------|---------------|------|------|------|------|------|------|------|------|------|------|------|
|                | 24"           | 26"  | 28"  | 30"  | 32"  | 34"  | 36"  | 38"  | 40"  | 42"  | 44"  | 46"  |
| 2.18           | 1831          | 1690 | 1570 | 1465 | 1373 | 1293 | 1221 | 1157 | 1099 | 1046 | 999  | 955  |
| 2.50           | 2100          | 1938 | 1800 | 1680 | 1575 | 1482 | 1400 | 1326 | 1290 | 1200 | 1145 | 1096 |
| 2.74           | 2301          | 2124 | 1973 | 1841 | 1726 | 1625 | 1534 | 1454 | 1381 | 1315 | 1255 | 1201 |
| 3.08           | 2587          | 2388 | 2218 | 2070 | 1940 | 1826 | 1725 | 1634 | 1552 | 1478 | 1411 | 1350 |
| 3.23           | 2713          | 2504 | 2326 | 2170 | 2035 | 1915 | 1809 | 1714 | 1628 | 1550 | 1480 | 1416 |
| 3.50           | 2940          | 2714 | 2520 | 2352 | 2205 | 2075 | 1960 | 1857 | 1764 | 1680 | 1604 | 1534 |
| 3.73           | 3133          | 2892 | 2686 | 2507 | 2349 | 2212 | 2089 | 1979 | 1880 | 1790 | 1709 | 1635 |
| 3.90           | 3276          | 3024 | 2808 | 2621 | 2457 | 2312 | 2184 | 2069 | 1966 | 1872 | 1787 | 1709 |
| 4.10           | 3444          | 3179 | 2952 | 2755 | 2583 | 2431 | 2296 | 2175 | 2066 | 1968 | 1879 | 1797 |
| 4.56           | 3830          | 3536 | 3283 | 3064 | 2873 | 2704 | 2554 | 2419 | 2298 | 2189 | 2089 | 1998 |
| 4.88           | 4099          | 3784 | 3513 | 3279 | 3074 | 2894 | 2733 | 2589 | 2460 | 2342 | 2236 | 2139 |

### Finding Overall Tire Diameter, RPM, MPH, or Rear Axle Ratio

**OVERALL TIRE DIAMETER:**  $\frac{\text{MPH} \times \text{Axle Ratio} \times 336}{\text{RPM}}$

**RPM:**  $\frac{\text{MPH} \times \text{Axle Ratio} \times 336}{\text{Tire Diameter}}$

**MPH:**  $\frac{\text{RPM} \times \text{Overall Diameter}}{\text{Axle Ratio} \times 336}$

**Axle Ratio:**  $\frac{\text{RPM} \times \text{Tire Diameter}}{\text{MPH} \times 336}$

# Crane Cams & Valve Train Products Section

## ***Advanced Tips to Choose the Proper Camshaft***

Although pages 14 and 15 in this catalog outline the very basic steps in selecting the best camshaft for a particular application, we can certainly add to the criteria needed for the best possible results. For general street (or marine) applications, the following will help provide an enhanced guideline.

### **Exactly what engine is it?**

This sounds really obvious, but a lot of folks aren't really knowledgeable on what they're working with. For example, "I've got a small-block Chevrolet." It could be a 1957-87 powerplant that was originally equipped with a flat faced lifter camshaft, or it could be a 1987-96 style engine that came with a hydraulic roller camshaft. Each basic engine requires a different style camshaft. Similar choices can also occur with the evolution of big block Chevrolets, small block Fords, small block Mopars, and many others. In the 1970's General Motors exchanged the Buick, Oldsmobile, and Pontiac bodies and engines, with some folks not understanding that the Buick 455, Oldsmobile 455, and Pontiac 455 V-8s are all totally different engines. Any information that can be obtained to verify which engine that the customer has, will help make the correct choice the first time.

### **What cubic inch displacement is the engine?**

A smaller engine will usually require a shorter duration camshaft than a larger engine, given all other factors being equal.

### **What compression ratio is the the engine?**

An answer of "stock" is not really sufficient, as compression ratios of most engines changed during their production runs, due to differing horsepower ratings, emissions concerns, the vehicle that it was originally installed in, etc. A basic generalization that higher compression ratio engines can use camshafts with larger (more radical) duration figures will normally apply.

### **What cylinder heads do you have?**

Iron or aluminum, stock or ported, standard combustion chamber size or milled? These factors are also critical. Aluminum cylinder heads dissipate heat more readily, enabling them to use slightly milder camshafts for best torque characteristics. A good approximation is that going from iron heads to aluminum heads is like lowering the compression ratio 0.75 (i.e.: a 9.25:1 engine with iron heads will have similar characteristics to a 10.00:1 engine with aluminum heads). Installing heads with smaller combustion chambers will raise the compression ratio, so don't forget to take that into account. High compression combined with too mild a camshaft will cause problems with detonation, and reducing the ignition timing to compensate for this will usually hurt the torque and horsepower everywhere throughout the power band.

### **What intake manifold is on it?**

In carbureted applications, a dual plane manifold will favor low-end and mid-range power, with a single plane unit being good for upper RPM usage. If you've got a single plane manifold on a relatively mild street machine, you may want a milder cam to pick up the bottom-end torque.

### **Do you have a supercharger/turbocharger/nitrous oxide?**

All of these enhancements will greatly influence the camshaft recommendation. Supercharged combinations tend to have slightly lower compression ratios, with slightly milder camshafts on wide lobe separation. Turbocharged engines might have slightly lower compression ratios (or not, if an inter-cooler is used), with a mild cam used to minimize overlap area. Heavy NOX applications might need a longer exhaust duration with a wide lobe separation in order to relieve the greater exhaust heat that's generated.

*Section Continued* 



## *Advanced Tips to Choose the Proper Camshaft (continued)*

### **What carburetor/throttle body are you using?**

The larger units favor upper-end performance, so a proper match here is essential to put the power into your intended RPM operating range.

### **What's your cranking compression?**

With the advent and widespread usage of the cylinder leakdown checkers, most folks have forgotten about the compression gauge. This is still a very valuable tool to verify your cylinder pressure, as it will illustrate the effects of a camshaft (or compression ratio) change, which a leakdown tester won't. Higher pressures will give an indication of how much ignition timing that you can run, what octane gasoline that's required to prevent detonation, and help to provide a tuning baseline for varying atmospheric conditions.

### **Headers or stock exhaust manifolds?**

A good exhaust system can be really beneficial in most any application. Going to really large diameter systems in a mild application can hurt the torque curve, so don't get carried away there. In V-8 situations, a crossover pipe is advised for dual exhaust systems.

### **What transmission do you have?**

Manual vs. automatic, how many gears, additional stall speed in the converter? This will help determine how broad the power curve needs to be, with milder cams traditionally having better torque and drivability over a wider RPM range.

### **What's the rear end ratio and rear tire diameter?**

This will provide the basic operating and cruising RPM of the vehicle, one of the most critical portions of the camshaft selection process. Each of our grinds lists a basic operating band to help in the selection.

### **How much does the vehicle weigh?**

Heavier cars may need milder camshafts with wider torque bands for best results.

### **What altitude will this engine normally be used at?**

An engine at sea level will normally use a more radical camshaft than one at 5,000 feet (we're back to the compression gauge/cylinder pressure factor again).

### **What idle quality and drivability factor are you looking for?**

This is the one area where the customer's individual desires can influence overall choices. If a radical idle is wanted with no concern for vacuum readings, go with the higher duration/narrower lobe separation options. If a smooth idle with lots of low-end torque is the choice, use the shorter duration/wider lobe separation cam.

All of this adds up to formulating a workable combination to produce the best overall performance that's needed to get the job done. We see combinations every day that are put together with little thought to the overall picture. Too much compression ratio, in too heavy a car, and a single plane intake manifold, with low numerical rear end ratios: no camshaft will be able to make up for a drastic mismatch of components. If possible, try to help the customer obtain the correct components from the beginning of his project. This will produce the best results, with time and money being saved by not having to repurchase items that were poorly chosen the first time.

# Camshaft Quick Reference Guide

This is a listing with basic specifications of all the camshaft grinds that appear in this catalog. It is arranged alphabetically by manufacturer, then by engine type, going from smaller to larger displacements, then by year. The camshafts are then grouped by lifter configuration: Hydraulic Lifter; Hydraulic Roller Lifter; Mechanical Lifter; Roller Lifter. Finally arranged by duration at .050" cam lift ranging from the mildest (shortest duration) to the most radical (greatest duration).

This provides a condensed version of the complete camshaft specification listings that appear on each page of the Engine Application section that follows. If you're sure of what camshaft specifications you need, want to easily browse our catalog offerings, or just want to verify the specs of a Crane camshaft that you have, this should meet your needs. Additional application information and cam timing specs are on the Engine Application pages 40 through 283, along with the recommended components for each one.

Specifications of all of the other camshafts that we have ever produced, including every one of our custom grinds are available from our Customer Service and Technical Service staff at 866-388-5120.

| Grind Number  | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |  |
|---|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|--|
|   |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |  |
| <b>American Motors/Jeep 6 Cylinder 64-05 - 199-232-243 (4.0L)-258 (4.2L) cu.in.</b> |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| <b>Hydraulic Lifter Camshafts</b>   |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| H-192/2667-25-10  | 750501      | 800-4200        | 192             | 204  | 248                 | 260  | 110       | .000       | .000 | .427             | .456 |  |
| H-260-2   | 753901      | 1200-4800       | 204             | 216  | 260                 | 272  | 112       | .000       | .000 | .456             | .484 |  |
| H-272-2   | 753941      | 1800-5400       | 216             | 228  | 272                 | 284  | 112       | .000       | .000 | .484             | .512 |  |
| H-222/3200-2-8  | 750591      | 2600-6200       | 222             | 232  | 294                 | 304  | 108       | .000       | .000 | .512             | .538 |  |
| <b>Mechanical Lifter Camshafts</b>  |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| F-228/3334-2-12   | 751101      | 2200-6000       | 228             | 238  | 264                 | 274  | 112       | .028       | .030 | .533             | .555 |  |
| F-238/3467-2-8  | 751121      | 2800-6600       | 238             | 248  | 274                 | 284  | 108       | .028       | .030 | .555             | .576 |  |
| <b>American Motors/Jeep V-8 66-91 - 290-304-343-360 (5.9L)-390-401 cu.in.</b>       |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| <b>Hydraulic Lifter Camshafts</b>   |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| H-192/2667-25-10  | 860501      | 800-4200        | 192             | 204  | 248                 | 260  | 110       | .000       | .000 | .427             | .456 |  |
| H-260-2   | 863901      | 1200-4800       | 204             | 216  | 260                 | 272  | 112       | .000       | .000 | .456             | .484 |  |
| H-260-2   | 863902      | 1200-4800       | 204             | 216  | 260                 | 272  | 112       | .000       | .000 | .456             | .484 |  |
| H-272-2   | 863941      | 1800-5400       | 216             | 228  | 272                 | 284  | 112       | .000       | .000 | .484             | .512 |  |
| H-272-2   | 863942      | 1800-5400       | 216             | 228  | 272                 | 284  | 112       | .000       | .000 | .484             | .512 |  |
| H-288-2   | 864441      | 2400-6000       | 226             | 230  | 288                 | 292  | 112       | .000       | .000 | .488             | .496 |  |
| H-288-2   | 864442      | 2400-6000       | 226             | 230  | 288                 | 292  | 112       | .000       | .000 | .488             | .496 |  |
| H-232/310-8   | 860641      | 2800-6200       | 232             | 232  | 312                 | 312  | 108       | .000       | .000 | .496             | .496 |  |
| H-302-2   | 864561      | 3000-6600       | 232             | 242  | 302                 | 312  | 112       | .000       | .000 | .538             | .563 |  |
| H-242/3520-2-12   | 860661      | 3400-7000       | 242             | 252  | 314                 | 324  | 112       | .000       | .000 | .563             | .589 |  |
| H-252/3680-2-10   | 860681      | 4000-7200       | 252             | 262  | 324                 | 334  | 110       | .000       | .000 | .589             | .614 |  |
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| HR-208/3313-25-12   | 869501      | 1000-5200       | 208             | 216  | 264                 | 272  | 112       | .000       | .000 | .530             | .530 |  |
| HR-216/325-25-12  | 869511      | 1600-5600       | 216             | 224  | 278                 | 286  | 112       | .000       | .000 | .520             | .542 |  |
| HR-224/339-25-12  | 869521      | 2000-6000       | 224             | 232  | 286                 | 294  | 112       | .000       | .000 | .542             | .563 |  |
| HR-232/352-25-10  | 869531      | 2600-6600       | 232             | 240  | 294                 | 302  | 110       | .000       | .000 | .563             | .584 |  |
| HR-244/372-25-12  | 869541      | 3200-7000       | 244             | 256  | 306                 | 318  | 112       | .000       | .000 | .595             | .595 |  |
| <b>Mechanical Lifter Camshafts</b>  |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| F-238/3200-2-12   | 861201      | 2800-6400       | 238             | 248  | 300                 | 310  | 112       | .022       | .022 | .512             | .533 |  |
| F-248/3334-2-12   | 861241      | 3400-7000       | 248             | 258  | 310                 | 320  | 112       | .022       | .022 | .533             | .555 |  |
| F-258/3468-8  | 861321      | 4000-7400       | 258             | 258  | 320                 | 320  | 108       | .022       | .022 | .555             | .555 |  |
| <b>Mechanical Roller Camshafts</b>  |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| SR-236/350-25-10  | 868511      | 2600-6600       | 236             | 244  | 286                 | 294  | 110       | .020       | .020 | .560             | .579 |  |
| R-258/420-25-6  | 868821      | 3800-7800       | 258             | 266  | 290                 | 298  | 106       | .020       | .020 | .672             | .672 |  |
| <b>Buick V-8 67-76 - 400-430-455 cu.in.</b>   |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| <b>Hydraulic Lifter Camshafts</b>   |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| H-194/250-25-10   | 850501      | 800-4200        | 194             | 202  | 252                 | 260  | 110       | .000       | .000 | .400             | .416 |  |
| H-202/260-25-10   | 850521      | 1200-4800       | 202             | 210  | 260                 | 268  | 110       | .000       | .000 | .416             | .432 |  |
| H-218/280-25-12   | 850571      | 1800-5400       | 218             | 226  | 276                 | 284  | 112       | .000       | .000 | .448             | .464 |  |
| H-226/290-25-10   | 850631      | 2200-5800       | 226             | 234  | 284                 | 292  | 110       | .000       | .000 | .464             | .480 |  |
| 1385557   | 850421      | 2200-5200       | 226             | 255  | 312                 | 332  | 115       | .000       | .000 | .453             | .482 |  |
| H-242/310-25-10   | 850671      | 2800-6600       | 242             | 250  | 300                 | 308  | 110       | .000       | .000 | .496             | .512 |  |
| H-252/348-25-12   | 850701      | 3600-6800       | 252             | 260  | 322                 | 330  | 112       | .000       | .000 | .557             | .576 |  |

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

### Cadillac V-8 68-81 - 368-425-472-500 cu.in.

#### Hydraulic Lifter Camshafts

|                 |         |           |     |     |     |     |     |      |      |      |      |
|-----------------|---------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-202/260-2S-14 | 1020541 | 1200-4800 | 202 | 210 | 260 | 268 | 114 | .000 | .000 | .447 | .464 |
| H-210/270-2S-12 | 1020561 | 1400-5200 | 210 | 218 | 268 | 276 | 112 | .000 | .000 | .464 | .482 |
| H-218/280-2S-12 | 1020571 | 1800-5600 | 218 | 226 | 276 | 284 | 112 | .000 | .000 | .482 | .499 |
| H-226/290-2S-12 | 1020631 | 2200-5800 | 226 | 234 | 284 | 292 | 112 | .000 | .000 | .499 | .516 |
| H-234/300-2S-12 | 1020641 | 2800-6400 | 234 | 242 | 292 | 300 | 112 | .000 | .000 | .516 | .533 |

### Chevrolet 6 Cylinder 62-84 - 194-230-250 cu.in.

#### Hydraulic Lifter Camshafts

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-192/2667-2S-12 | 200511 | 800-4200  | 192 | 204 | 248 | 260 | 112 | .000 | .000 | .467 | .498 |
| H-260-2          | 203901 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .498 | .530 |
| H-272-2          | 204541 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .530 | .560 |
| H-234/3250-2-6   | 200541 | 3000-6000 | 234 | 244 | 304 | 314 | 106 | .000 | .000 | .569 | .593 |

#### Mechanical Lifter Camshafts

|                 |        |           |     |     |     |     |     |      |      |      |      |
|-----------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| F-238/3200-2-8  | 201141 | 2800-6600 | 238 | 248 | 304 | 314 | 108 | .022 | .022 | .560 | .583 |
| F-248/3334-2-6  | 201221 | 3400-6800 | 248 | 258 | 310 | 320 | 106 | .022 | .022 | .583 | .607 |
| F-256/3634-2S-8 | 201311 | 4200-7200 | 256 | 260 | 292 | 296 | 108 | .026 | .026 | .636 | .646 |

### Chevrolet 60° V-6 80-94 - 173 (2.8L)-189 (3.1L) cu.in.-3.4L

#### Hydraulic Lifter Camshafts

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-192/2667-2S-12 | 250511 | 800-4200  | 192 | 204 | 248 | 260 | 112 | .000 | .000 | .400 | .427 |
| 2020             | 254112 | 800-4200  | 198 | 204 | 258 | 264 | 104 | .000 | .000 | .401 | .423 |
| 2030             | 254122 | 1200-4600 | 204 | 214 | 264 | 274 | 109 | .000 | .000 | .423 | .423 |
| H-260-2          | 253901 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .427 | .454 |
| H-260-2          | 253902 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .427 | .454 |
| H-272-2          | 253941 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .454 | .480 |
| H-222/3114-2S-10 | 250321 | 2200-6000 | 222 | 234 | 278 | 290 | 110 | .000 | .000 | .467 | .494 |

### Chevrolet 90° V-6 92-02 - 262 (4.3L) cu.in.

#### Hydraulic Roller Camshafts

|                  |         |           |     |     |     |     |     |      |      |      |      |
|------------------|---------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-194/271-2-12  | 1439801 | 800-4600  | 194 | 204 | 250 | 260 | 112 | .000 | .000 | .407 | .429 |
| HR-204/286-2S-12 | 1439811 | 1200-5200 | 204 | 214 | 260 | 276 | 112 | .000 | .000 | .429 | .430 |
| HR-214/325-2S-12 | 1439721 | 1600-5600 | 214 | 222 | 276 | 284 | 112 | .000 | .000 | .488 | .509 |
| HR-222/339-2S-12 | 1439731 | 2200-6000 | 222 | 230 | 284 | 292 | 112 | .000 | .000 | .509 | .528 |
| HR-230/352-2S-12 | 1439531 | 2600-6400 | 230 | 234 | 292 | 296 | 112 | .000 | .000 | .528 | .539 |

### Chevrolet V-8 57-87 (also: 87-95 trucks w/standard [non-roller] hydraulic lifters) - 262-267 (4.4L)-283-302-305 (5.0L)-307-327-350 (5.7L)-400 cu.in.

#### Hydraulic Lifter Camshafts

|         |        |           |     |     |     |     |     |      |      |      |      |
|---------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| 2010    | 114102 | 500-4000  | 184 | 194 | 244 | 254 | 104 | .000 | .000 | .378 | .401 |
| H-248-2 | 113971 | 800-4600  | 192 | 204 | 248 | 260 | 112 | .000 | .000 | .400 | .427 |
| H-248-2 | 113972 | 800-4600  | 192 | 204 | 248 | 260 | 112 | .000 | .000 | .400 | .427 |
| 2020    | 114112 | 800-4400  | 194 | 204 | 254 | 264 | 104 | .000 | .000 | .401 | .423 |
| 3896929 | 968711 | 800-4500  | 195 | 202 |     |     | 112 | .000 | .000 | .390 | .410 |
| 260 H10 | 10003  | 1000-4600 | 204 | 204 | 260 | 260 | 110 | .000 | .000 | .427 | .427 |
| 260 H10 | 100032 | 1000-4600 | 204 | 204 | 260 | 260 | 110 | .000 | .000 | .427 | .427 |
| 2030    | 114122 | 1200-4800 | 204 | 214 | 264 | 274 | 110 | .000 | .000 | .423 | .446 |
| H-260-2 | 113901 | 1200-5000 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .427 | .454 |
| H-260-2 | 113902 | 1200-5000 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .427 | .454 |
| Z-256-2 | 113501 | 1200-5200 | 206 | 218 | 256 | 268 | 112 | .000 | .000 | .432 | .459 |
| Z-256-2 | 113502 | 1200-5200 | 206 | 218 | 256 | 268 | 112 | .000 | .000 | .432 | .459 |
| 266 H10 | 10004  | 1400-5000 | 210 | 210 | 266 | 266 | 110 | .000 | .000 | .440 | .440 |
| 266 H10 | 100042 | 1400-5000 | 210 | 210 | 266 | 266 | 110 | .000 | .000 | .440 | .440 |
| 2040    | 114132 | 1600-5400 | 210 | 216 | 270 | 276 | 114 | .000 | .000 | .440 | .454 |
| H-266-2 | 113931 | 1600-5200 | 210 | 216 | 266 | 272 | 114 | .000 | .000 | .440 | .454 |
| H-266-2 | 113932 | 1600-5200 | 210 | 216 | 266 | 272 | 114 | .000 | .000 | .440 | .454 |
| Z-262-2 | 113511 | 1600-5400 | 212 | 218 | 262 | 268 | 114 | .000 | .000 | .446 | .459 |
| Z-262-2 | 113512 | 1600-5400 | 212 | 218 | 262 | 268 | 114 | .000 | .000 | .446 | .459 |
| 272 H10 | 10005  | 1600-5400 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .454 | .454 |
| 272 H10 | 100052 | 1600-5400 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .454 | .454 |
| 2050    | 114142 | 1800-5600 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .454 | .480 |
| H-272-2 | 113941 | 1800-5600 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .454 | .480 |
| H-272-2 | 113942 | 1800-5600 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .454 | .480 |

Section Continued





# Camshaft Quick Reference Guide

QUICK REFERENCE

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

## ***Chevrolet V-8 57-87 (also: 87-95 trucks w/standard [non-roller] hydraulic lifters) - 262-267 (4.4L)-283-302-305 (5.0L)-307-327-350 (5.7L)-400 cu.in.***

### **Mechanical Roller Camshafts**

|                            |        |           |     |     |     |     |     |      |      |      |      |
|----------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| R-264/420-251-10           | 118921 | 4200-8200 | 264 | 272 | 296 | 304 | 110 | .020 | .020 | .630 | .630 |
| R-264/420-251-10 SFO       | 118941 | 4200-8200 | 264 | 272 | 296 | 304 | 110 | .020 | .020 | .630 | .630 |
| 298-311-06RRD.95           | 19139  | 4400-8000 | 264 | 273 | 298 | 311 | 106 | .012 | .030 | .670 | .615 |
| R-264/4381-25-8 RB RD      | 118771 | 4400-8000 | 264 | 268 | 296 | 300 | 108 | .020 | .022 | .745 | .745 |
| R-264/4381-25-8 LWD RD 55J | 118781 | 4400-8000 | 264 | 268 | 296 | 300 | 108 | .020 | .022 | .745 | .745 |
| R-268/420-251-7            | 118871 | 4600-8200 | 268 | 272 | 300 | 304 | 107 | .020 | .020 | .630 | .630 |
| R-268/4467-25-6.96         | 118421 | 4400-8200 | 268 | 276 | 298 | 314 | 106 | .012 | .022 | .670 | .625 |
| R-268/4467-25-6.96 SFO     | 118441 | 4400-8200 | 268 | 276 | 298 | 314 | 106 | .012 | .022 | .670 | .625 |
| R-268/452-25-7             | 118791 | 4400-8200 | 268 | 272 | 297 | 301 | 107 | .020 | .022 | .746 | .746 |
| R-270/420-258-6            | 118881 | 4400-8200 | 270 | 276 | 302 | 308 | 106 | .020 | .020 | .630 | .630 |
| R-272/4334-252-10          | 118321 | 4400-8200 | 272 | 282 | 312 | 322 | 110 | .026 | .026 | .650 | .641 |
| R-272/4334-252-10 SFO      | 118331 | 4400-8200 | 272 | 282 | 312 | 322 | 110 | .026 | .026 | .650 | .641 |
| R-272/428-25-6 SFO         | 118291 | 4600-8200 | 272 | 280 | 302 | 310 | 106 | .020 | .014 | .770 | .715 |
| R-274/4541-25-6.90         | 118801 | 4600-8200 | 274 | 282 | 305 | 313 | 106 | .020 | .022 | .681 | .681 |
| R-276/420-251-6            | 118891 | 4600-8400 | 276 | 284 | 308 | 316 | 106 | .020 | .020 | .630 | .630 |
| R-276/5152-25-14 SFO 55J   | 118991 | 6000-9800 | 276 | 292 | 306 | 326 | 114 | .020 | .026 | .927 | .720 |
| R-278/452-252-6 SFO        | 118961 | 4800-8400 | 278 | 284 | 307 | 313 | 106 | .020 | .022 | .746 | .746 |
| R-280/420-25-8             | 118901 | 5000-8600 | 280 | 284 | 312 | 316 | 108 | .020 | .020 | .630 | .630 |
| R-280/450-25-8             | 118361 | 5000-8600 | 280 | 284 | 320 | 324 | 108 | .026 | .026 | .675 | .641 |
| R-282/4765-252-10          | 118381 | 5000-8600 | 282 | 290 | 316 | 324 | 110 | .035 | .030 | .715 | .688 |
| R-282/4765-252-12          | 118451 | 6000-9400 | 282 | 290 | 316 | 324 | 112 | .035 | .030 | .786 | .757 |
| R-282/4765-252-12 SFO      | 118461 | 6000-9400 | 282 | 290 | 316 | 324 | 112 | .035 | .030 | .786 | .757 |
| R-282/5002-25-13 SFO       | 118491 | 6000-9600 | 282 | 290 | 312 | 330 | 113 | .020 | .030 | .825 | .776 |
| R-286/4765-253-12          | 118471 | 6000-9800 | 286 | 294 | 320 | 328 | 112 | .035 | .030 | .786 | .757 |
| R-286/4765-253-12 SFO      | 118481 | 6000-9800 | 286 | 294 | 320 | 328 | 112 | .035 | .030 | .786 | .757 |

## ***Chevrolet V-8 87-92 - 305 (5.0L)-350 (5.7L) cu.in.***

### **Hydraulic Roller Camshafts**

|      |        |           |     |     |     |     |     |      |      |      |      |
|------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| 2010 | 104201 | 500-4200  | 184 | 194 | 246 | 256 | 106 | .000 | .000 | .384 | .407 |
| 2011 | 104204 | 500-4400  | 184 | 204 | 246 | 266 | 108 | .000 | .000 | .384 | .429 |
| 2020 | 104211 | 800-4600  | 194 | 204 | 256 | 266 | 111 | .000 | .000 | .407 | .429 |
| 2030 | 104221 | 1200-5200 | 204 | 214 | 260 | 270 | 116 | .000 | .000 | .429 | .452 |
| 2031 | 104225 | 1400-5400 | 208 | 214 | 264 | 270 | 112 | .000 | .000 | .438 | .452 |
| 2032 | 104224 | 1800-5800 | 214 | 220 | 270 | 276 | 112 | .000 | .000 | .452 | .465 |

## ***Chevrolet V-8 87-99 - 305 (5.0L)-350 (5.7L) cu.in. (except 5.7L LS1)***

### **Hydraulic Roller Camshafts**

|                        |        |           |     |     |     |     |     |      |      |      |      |
|------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-260-2-12 IG         | 109811 | 1000-5200 | 204 | 214 | 260 | 270 | 112 | .000 | .000 | .429 | .452 |
| HR-206/319-25-12.90 IG | 109851 | 1000-5200 | 206 | 214 | 268 | 276 | 112 | .000 | .000 | .479 | .498 |
| HR-276-25-12 IG        | 109821 | 1600-5800 | 214 | 222 | 276 | 284 | 112 | .000 | .000 | .488 | .509 |
| HR-216/339-25-12.90 IG | 109671 | 1600-5800 | 216 | 224 | 284 | 292 | 112 | .000 | .000 | .509 | .528 |
| HR-218/332-253-12 IG   | 109861 | 1800-6000 | 218 | 226 | 280 | 288 | 112 | .000 | .000 | .498 | .518 |
| HR-284-25-12 IG        | 109831 | 2000-6200 | 222 | 230 | 284 | 292 | 112 | .000 | .000 | .509 | .528 |
| HR-224/345-25-14.04 IG | 109871 | 2200-6400 | 224 | 232 | 286 | 294 | 114 | .000 | .000 | .518 | .539 |
| HR-230/359-25-12.90 IG | 109661 | 2600-6600 | 230 | 238 | 292 | 300 | 112 | .000 | .000 | .539 | .558 |
| HR-296-25-12 IG        | 109841 | 2800-6800 | 234 | 242 | 296 | 304 | 112 | .000 | .000 | .539 | .558 |
| HR-234/365-25-12.90 IG | 109691 | 2800-6800 | 234 | 242 | 296 | 304 | 112 | .000 | .000 | .548 | .558 |
| HR-302-25-10.04 IG     | 109651 | 3200-7200 | 240 | 244 | 302 | 306 | 110 | .000 | .000 | .558 | .558 |

### **Mechanical Roller Camshafts**

|                        |        |           |     |     |     |     |     |      |      |      |      |
|------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| SR-228/338-25-12 IG    | 108541 | 2200-6200 | 228 | 236 | 278 | 280 | 112 | .020 | .020 | .507 | .525 |
| SR-232/350-25-12.90 IG | 108571 | 2400-6600 | 232 | 240 | 286 | 294 | 112 | .020 | .020 | .525 | .543 |
| SR-236/350-25-12 IG    | 108551 | 2400-6600 | 236 | 244 | 286 | 294 | 112 | .020 | .020 | .525 | .543 |
| SR-240/362-25-12.90 IG | 108611 | 3400-7200 | 240 | 248 | 294 | 302 | 112 | .020 | .020 | .543 | .561 |
| SR-244/362-25-12 IG    | 108521 | 3400-7200 | 244 | 252 | 294 | 302 | 112 | .020 | .020 | .543 | .561 |

## ***Chevrolet V-8 92-96 - 305 (5.0L)-350 (5.7L) cu.in. LT1***

### **Hydraulic Roller Camshafts**

|      |        |           |     |     |     |     |     |      |      |      |      |
|------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| 2033 | 104227 | 1500-5700 | 210 | 224 | 272 | 286 | 112 | .000 | .000 | .479 | .518 |
| 2050 | 104241 | 2400-6400 | 218 | 218 | 280 | 280 | 116 | .000 | .000 | .498 | .498 |

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

**Chevrolet V-8 97-13 (also 99-13 Vortec 4800, 5300, 6000, 6200) - 4.8 - 5.3 - 5.7 (346) - 6.0 - 6.2L LS1, LS2, LS3/L92, LS6**

**Hydraulic Roller Camshafts**

|                       |         |           |     |     |     |     |     |      |      |      |      |
|-----------------------|---------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-206/294-25-14.55   | 1449511 | 1400-5500 | 206 | 214 | 270 | 278 | 114 | .000 | .000 | .500 | .500 |
| HR-210/3241-25-14 4A  | 1449041 | 1800-6000 | 210 | 218 | 272 | 280 | 114 | .000 | .000 | .551 | .551 |
| HR-210/3241-25-16 2A  | 1449051 | 1600-6000 | 210 | 218 | 272 | 280 | 116 | .000 | .000 | .551 | .551 |
| HR-216/3241-15        | 1449061 | 2200-6300 | 216 | 216 | 278 | 278 | 115 | .000 | .000 | .551 | .551 |
| HR-216/344-251-16 3A  | 1449071 | 1900-6000 | 216 | 222 | 277 | 283 | 116 | .000 | .000 | .585 | .585 |
| HR-216/3241-25-15     | 1449561 | 2000-6500 | 216 | 224 | 278 | 286 | 115 | .000 | .000 | .551 | .551 |
| HR-216/344-25-14      | 1449081 | 2200-6500 | 216 | 224 | 277 | 285 | 114 | .000 | .000 | .585 | .585 |
| HR-220/3241-251-14    | 1449011 | 2400-6500 | 220 | 224 | 282 | 286 | 114 | .000 | .000 | .551 | .551 |
| HR-222/3241-25-15 3A  | 1449091 | 2300-6800 | 222 | 228 | 284 | 290 | 115 | .000 | .000 | .551 | .551 |
| HR-224/3241-14        | 1449591 | 2300-6500 | 224 | 224 | 286 | 286 | 114 | .000 | .000 | .551 | .551 |
| HR-224/3241-25-14 2A  | 1449101 | 2200-6500 | 224 | 228 | 286 | 290 | 114 | .000 | .000 | .551 | .551 |
| HR-224/347-25-14 4A   | 1449111 | 2300-6500 | 224 | 228 | 280 | 283 | 114 | .000 | .000 | .590 | .590 |
| HR-224/347-251-15 4A  | 1449121 | 2400-6500 | 224 | 232 | 280 | 287 | 115 | .000 | .000 | .590 | .590 |
| HR-228/353-13 4A      | 1449131 | 2700-6500 | 228 | 228 | 290 | 290 | 113 | .000 | .000 | .600 | .600 |
| HR-228/3241-25-12     | 1449141 | 2700-6500 | 228 | 232 | 290 | 294 | 112 | .000 | .000 | .551 | .551 |
| HR-228/353-251-12     | 1449601 | 2400-6500 | 228 | 232 | 290 | 294 | 112 | .000 | .000 | .600 | .600 |
| HR-228/353-251-14 2A  | 1449151 | 2400-6500 | 228 | 232 | 290 | 294 | 114 | .000 | .000 | .600 | .600 |
| HR-228/347-25-15 0A   | 1449161 | 2400-6500 | 228 | 236 | 283 | 291 | 115 | .000 | .000 | .590 | .590 |
| HR-232/353-25R-17 2A  | 1449171 | 2600-6400 | 232 | 228 | 294 | 290 | 117 | .000 | .000 | .600 | .600 |
| HR-232/353-251-12 4A  | 1449181 | 2900-6500 | 232 | 236 | 294 | 298 | 112 | .000 | .000 | .600 | .600 |
| HR-232/3241-251-17 3A | 1449191 | 2600-6600 | 232 | 240 | 294 | 302 | 117 | .000 | .000 | .551 | .551 |
| HR-232/353-25-10 0A   | 1449201 | 2900-6600 | 232 | 240 | 294 | 302 | 110 | .000 | .000 | .600 | .600 |
| HR-236/347-25-14 0A   | 1449211 | 3000-6800 | 236 | 240 | 291 | 295 | 114 | .000 | .000 | .590 | .590 |
| HR-236/353-25-12      | 1449611 | 3000-6800 | 236 | 240 | 298 | 302 | 112 | .000 | .000 | .600 | .600 |
| HR-236/347-251-15     | 1449221 | 2800-6800 | 236 | 244 | 291 | 299 | 115 | .000 | .000 | .590 | .590 |
| HR-236/353-2-10 0A    | 1449231 | 3200-6800 | 236 | 246 | 298 | 308 | 110 | .000 | .000 | .600 | .600 |
| HR-240/353-25R-14     | 1449241 | 3300-7000 | 240 | 236 | 302 | 298 | 114 | .000 | .000 | .600 | .600 |
| HR-240/353-25-14 4A   | 1449251 | 3000-7000 | 240 | 246 | 302 | 308 | 114 | .000 | .000 | .600 | .600 |
| HR-246/367-2-14       | 1449261 | 3200-7200 | 246 | 256 | 303 | 313 | 114 | .000 | .000 | .624 | .624 |

**Mechanical Roller Camshafts**

|                    |         |           |     |     |     |     |     |      |      |      |      |
|--------------------|---------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| R-240/3821-25-10   | 1448051 | 3500-7500 | 240 | 244 | 269 | 273 | 110 | .020 | .022 | .649 | .649 |
| R-242/353-25-14    | 1448011 | 3300-7500 | 242 | 248 | 273 | 279 | 114 | .020 | .022 | .600 | .600 |
| R-244/382-25-10    | 1448061 | 3600-7600 | 244 | 248 | 273 | 277 | 110 | .020 | .022 | .649 | .649 |
| R-248/353-25-10 0A | 1448021 | 3600-7600 | 248 | 260 | 279 | 292 | 110 | .020 | .022 | .600 | .600 |
| R-262/395-25-8     | 1448031 | 3800-7800 | 262 | 268 | 296 | 302 | 108 | .020 | .022 | .671 | .671 |
| R-276/420-2-14     | 1448041 | 4600-8800 | 276 | 286 | 308 | 318 | 114 | .020 | .020 | .714 | .714 |

**Chevrolet V-8 06-13 - 7.0L LS7**

**Hydraulic Roller Camshafts**

|                       |         |           |     |     |     |     |     |      |      |      |      |
|-----------------------|---------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-220/3333-251-14 4A | 2039271 | 2100-6400 | 220 | 238 | 281 | 299 | 114 | .000 | .000 | .600 | .600 |
| HR-224/347-252-12 4A  | 2039281 | 2600-6800 | 224 | 244 | 280 | 299 | 112 | .000 | .000 | .625 | .625 |
| HR-224/347-252-15 4A  | 2039291 | 2300-6800 | 224 | 244 | 280 | 299 | 115 | .000 | .000 | .625 | .625 |
| HR-228/367-251-12 4A  | 2039341 | 2800-7000 | 228 | 246 | 285 | 303 | 112 | .000 | .000 | .661 | .661 |

**Chevrolet V-8 07-13 6.2L LS3/L92/Vortec 6.2 with three bolt timing gear**

**Hydraulic Roller Camshafts**

|                     |         |           |     |     |     |     |     |      |      |      |      |
|---------------------|---------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-216/347-25-13 4A | 2019371 | 2000-6000 | 216 | 232 | 272 | 289 | 113 | .000 | .000 | .590 | .624 |
| HR-220/347-25-13 4A | 2019381 | 2200-6400 | 220 | 236 | 276 | 293 | 113 | .000 | .000 | .590 | .624 |
| HR-226/367-251-14   | 2019391 | 2600-6000 | 226 | 240 | 283 | 240 | 114 | .000 | .000 | .624 | .624 |

# Camshaft Quick Reference Guide

QUICK REFERENCE

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

## Chevrolet V-8 58-65 - 348-409-427 (Z-11) cu.in.

### Hydraulic Lifter Camshafts

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-200/2717-2-10  | 150061 | 800-4400  | 200 | 210 | 264 | 274 | 110 | .000 | .000 | .475 | .502 |
| H-218/300-2S-12  | 150291 | 1800-5400 | 218 | 230 | 288 | 300 | 112 | .000 | .000 | .525 | .543 |
| H-224/3090-2-12  | 150301 | 2200-6000 | 224 | 234 | 294 | 304 | 112 | .000 | .000 | .541 | .569 |
| H-230/3101-2S-14 | 150311 | 2800-6400 | 230 | 234 | 292 | 296 | 114 | .000 | .000 | .543 | .551 |
| H-236/325-2-10   | 150171 | 3000-6600 | 236 | 246 | 296 | 306 | 110 | .000 | .000 | .569 | .588 |

### Hydraulic Roller Camshafts — Retrofit

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-218/332-2S-10 | 159511 | 1600-5600 | 218 | 226 | 280 | 288 | 110 | .000 | .000 | .581 | .604 |
| HR-224/319-2S-10 | 159521 | 2000-6000 | 224 | 230 | 280 | 286 | 110 | .000 | .000 | .558 | .574 |
| HR-230/352-2S-12 | 159531 | 2600-6600 | 230 | 234 | 292 | 296 | 112 | .000 | .000 | .616 | .628 |

### Mechanical Lifter Camshafts

|                 |        |           |     |     |     |     |       |      |      |      |      |
|-----------------|--------|-----------|-----|-----|-----|-----|-------|------|------|------|------|
| F-228/3067-2-10 | 150811 | 2500-5800 | 228 | 238 | 268 | 278 | 110   | .022 | .022 | .537 | .560 |
| 3796077         | 150421 | 3000-6200 | 234 | 234 | 280 | 280 | 116.5 | .018 | .022 | .434 | .434 |
| 3830690         | 150431 | 3200-6500 | 237 | 241 | 274 | 281 | 113.5 | .022 | .030 | .504 | .515 |
| 3837735         | 150441 | 3800-7200 | 250 | 250 | 296 | 296 | 113.5 | .030 | .030 | .555 | .555 |
| F-256/3412-2-10 | 151341 | 3800-7200 | 256 | 266 | 292 | 302 | 110   | .026 | .026 | .597 | .617 |

### Mechanical Roller Camshafts

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| SR-236/350-2S-12 | 158511 | 2600-5800 | 236 | 244 | 286 | 294 | 112 | .020 | .020 | .613 | .634 |
| SR-244/362-2S-10 | 158171 | 3000-6200 | 244 | 252 | 294 | 302 | 110 | .020 | .020 | .634 | .655 |
| SR-252/374-2S-12 | 158711 | 3400-6800 | 252 | 260 | 302 | 310 | 112 | .020 | .020 | .655 | .655 |

## Chevrolet V-8 67-95 - 396-402-427-454 cu.in.

### Hydraulic Lifter Camshafts

|                      |        |           |     |     |     |     |     |      |      |      |      |
|----------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-248-2              | 133971 | 600-4200  | 192 | 204 | 248 | 260 | 110 | .000 | .000 | .453 | .484 |
| 2020                 | 134112 | 800-4400  | 202 | 210 | 262 | 270 | 110 | .000 | .000 | .468 | .485 |
| 260 H10              | 10303  | 1000-4500 | 204 | 204 | 260 | 260 | 110 | .000 | .000 | .484 | .484 |
| 260 H10              | 103032 | 1000-4500 | 204 | 204 | 260 | 260 | 110 | .000 | .000 | .484 | .484 |
| H-260-2              | 133901 | 1000-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .484 | .515 |
| H-260-2              | 133902 | 1000-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .484 | .515 |
| 266 H10              | 10304  | 1200-4800 | 210 | 210 | 266 | 266 | 110 | .000 | .000 | .499 | .499 |
| 266 H10              | 103042 | 1200-4800 | 210 | 210 | 266 | 266 | 110 | .000 | .000 | .499 | .499 |
| 2030                 | 133931 | 1200-5000 | 210 | 218 | 266 | 274 | 114 | .000 | .000 | .485 | .502 |
| 2030                 | 134122 | 1200-5000 | 210 | 218 | 266 | 274 | 114 | .000 | .000 | .485 | .502 |
| 3883986              | 969391 | 1200-4600 | 214 | 218 |     |     | 115 | .000 | .000 | .461 | .480 |
| 272 H10              | 10305  | 1400-5000 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .515 | .515 |
| 272 H10              | 103052 | 1400-5000 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .515 | .515 |
| H-272-2              | 133941 | 1600-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .515 | .510 |
| H-272-2              | 133942 | 1600-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .515 | .510 |
| H-222/3114-2S1-8     | 130201 | 1800-5600 | 222 | 234 | 278 | 290 | 108 | .000 | .000 | .529 | .525 |
| H-278-2              | 133801 | 2000-5800 | 222 | 234 | 278 | 290 | 114 | .000 | .000 | .529 | .525 |
| H-278-2              | 133802 | 2000-5800 | 222 | 234 | 278 | 290 | 114 | .000 | .000 | .529 | .525 |
| 282 H08              | 10307  | 2200-5600 | 226 | 226 | 282 | 282 | 108 | .000 | .000 | .533 | .533 |
| 282 H08              | 103072 | 2200-5600 | 226 | 226 | 282 | 282 | 108 | .000 | .000 | .533 | .533 |
| 282 H08              | 133072 | 2200-5600 | 226 | 226 | 282 | 282 | 108 | .000 | .000 | .533 | .533 |
| H-286-2              | 134241 | 2400-6200 | 226 | 236 | 286 | 296 | 112 | .000 | .000 | .534 | .553 |
| H-286-2              | 134242 | 2400-6200 | 226 | 236 | 286 | 296 | 112 | .000 | .000 | .534 | .553 |
| 284 H12              | 10306  | 2800-6200 | 228 | 228 | 284 | 284 | 112 | .000 | .000 | .544 | .544 |
| H-228/312-2S-14 T1.2 | 132561 | 2800-6600 | 228 | 236 | 298 | 306 | 114 | .000 | .000 | .530 | .551 |
| H-230/318-2-10       | 130211 | 3000-6600 | 230 | 240 | 290 | 300 | 110 | .000 | .000 | .541 | .559 |
| H-236/325-2-10       | 134551 | 3000-6600 | 236 | 246 | 296 | 306 | 110 | .000 | .000 | .553 | .571 |
| H-236/325-2-10       | 134552 | 3000-6600 | 236 | 246 | 296 | 306 | 110 | .000 | .000 | .553 | .571 |
| H-296-2              | 134561 | 3000-6800 | 236 | 246 | 296 | 306 | 114 | .000 | .000 | .553 | .571 |
| 294-304 H14          | 10313  | 3200-6800 | 238 | 248 | 294 | 304 | 114 | .000 | .000 | .569 | .595 |
| H-240/329-2S-12      | 130221 | 3000-6800 | 240 | 246 | 300 | 306 | 112 | .000 | .000 | .559 | .571 |
| H-242/322-2-14       | 130231 | 3200-7000 | 242 | 252 | 322 | 332 | 114 | .000 | .000 | .547 | .566 |
| 328 H08              | 133101 | 3400-6800 | 246 | 246 | 328 | 328 | 108 | .000 | .000 | .567 | .567 |
| 328 H08              | 133102 | 3400-6800 | 246 | 246 | 328 | 328 | 108 | .000 | .000 | .567 | .567 |
| H-306-2              | 134571 | 3400-7000 | 246 | 254 | 306 | 314 | 112 | .000 | .000 | .571 | .585 |
| H-248/3500-2S-14     | 130241 | 3600-7000 | 248 | 256 | 304 | 312 | 114 | .000 | .000 | .595 | .595 |
| H-254/344-2S-14      | 130721 | 3800-7200 | 254 | 262 | 314 | 322 | 114 | .000 | .000 | .585 | .600 |
| H-262/353-2S-14      | 130731 | 4000-7200 | 262 | 270 | 322 | 330 | 114 | .000 | .000 | .600 | .615 |

Section Continued 



| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

**Chevrolet V-8 67-95 - 396-402-427-454 cu.in.**

**Hydraulic Roller Camshafts — Retrofit**

|                      |        |           |     |     |     |     |     |      |      |      |      |
|----------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-204/286-2-12 IG   | 139601 | 800-4600  | 204 | 214 | 260 | 270 | 112 | .000 | .000 | .486 | .512 |
| ZHR-276-25-10 IG     | 139001 | 1200-5000 | 214 | 222 | 276 | 284 | 110 | .000 | .000 | .553 | .576 |
| HR-214/325-25-12 IG  | 139351 | 1200-5200 | 214 | 222 | 276 | 284 | 112 | .000 | .000 | .553 | .576 |
| HR-218/3001-25-14 IG | 139611 | 1400-5200 | 218 | 224 | 278 | 284 | 114 | .000 | .000 | .510 | .510 |
| HR-222/339-25-10 IG  | 139761 | 1600-5400 | 222 | 230 | 284 | 292 | 110 | .000 | .000 | .576 | .598 |
| ZHR-288-25-12 IG     | 139011 | 1800-5600 | 226 | 234 | 288 | 296 | 112 | .000 | .000 | .587 | .610 |
| HR-230/352-251-14 IG | 139771 | 2000-5800 | 230 | 236 | 292 | 298 | 114 | .000 | .000 | .598 | .610 |
| ZHR-296-25-12 IG     | 139021 | 2200-6000 | 234 | 242 | 296 | 304 | 112 | .000 | .000 | .610 | .632 |
| HR-236/359-25-14 IG  | 139671 | 2200-6000 | 236 | 244 | 298 | 306 | 114 | .000 | .000 | .610 | .632 |
| HR-240/365-25-12 IG  | 139681 | 2600-6200 | 240 | 248 | 302 | 310 | 112 | .000 | .000 | .621 | .632 |
| HR-244/372-25-10 IG  | 139781 | 2800-6200 | 244 | 256 | 306 | 318 | 110 | .000 | .000 | .632 | .632 |
| HR-306-25-14 IG      | 139651 | 3000-6400 | 244 | 256 | 306 | 318 | 114 | .000 | .000 | .632 | .632 |
| HR-246/400-25-14 IG  | 139791 | 3200-6400 | 246 | 254 | 316 | 324 | 114 | .000 | .000 | .680 | .680 |
| HR-248/372-25-10 IG  | 139801 | 3000-6400 | 248 | 256 | 310 | 318 | 110 | .000 | .000 | .632 | .632 |
| HR-248/372-25-14 IG  | 139691 | 3200-6400 | 248 | 256 | 310 | 318 | 114 | .000 | .000 | .632 | .632 |
| HR-250/400-251-14 IG | 139811 | 3200-6400 | 250 | 258 | 320 | 328 | 114 | .000 | .000 | .680 | .680 |
| HR-254/400-25-14 IG  | 139701 | 3400-6600 | 254 | 262 | 324 | 332 | 114 | .000 | .000 | .680 | .680 |
| HR-256/372-25-10 IG  | 139821 | 3400-6600 | 256 | 264 | 318 | 326 | 110 | .000 | .000 | .632 | .632 |
| HR-318-25-14 IG      | 139661 | 3600-6600 | 256 | 264 | 318 | 326 | 114 | .000 | .000 | .632 | .632 |
| HR-258/4001-25-14 IG | 139831 | 3600-6600 | 258 | 266 | 328 | 336 | 114 | .000 | .000 | .680 | .680 |
| HR-262/400-252-14 IG | 139841 | 3800-6600 | 262 | 266 | 332 | 336 | 114 | .000 | .000 | .680 | .680 |
| HR-262/400-251-14 IG | 139711 | 3800-6600 | 262 | 270 | 332 | 340 | 114 | .000 | .000 | .680 | .680 |
| HR-264/420-25-15 IG  | 139861 | 4000-6800 | 264 | 272 | 328 | 336 | 115 | .000 | .000 | .714 | .714 |
| HR-270/400-25-14 IG  | 139851 | 4400-6800 | 270 | 282 | 340 | 347 | 114 | .000 | .000 | .680 | .680 |

**Mechanical Lifter Camshafts**

|                     |        |           |     |     |     |     |     |      |      |      |      |
|---------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| F-238/3200-2-8      | 131101 | 2600-6200 | 238 | 248 | 300 | 310 | 108 | .022 | .022 | .544 | .566 |
| F-304-2             | 133841 | 2800-6600 | 238 | 248 | 304 | 314 | 114 | .022 | .022 | .544 | .567 |
| 3863143             | 969961 | 3000-6400 | 242 | 242 |     |     | 114 | .024 | .028 | .520 | .520 |
| F-244/3454-25-8     | 131111 | 3200-6600 | 244 | 252 | 280 | 288 | 108 | .026 | .026 | .587 | .608 |
| F-244/3454-25-14    | 131121 | 3400-6800 | 244 | 252 | 280 | 288 | 114 | .026 | .026 | .587 | .608 |
| F-314-2             | 134781 | 3400-7000 | 248 | 258 | 314 | 324 | 110 | .022 | .022 | .567 | .590 |
| F-314-2             | 134782 | 3400-7000 | 248 | 258 | 314 | 324 | 110 | .022 | .022 | .567 | .590 |
| F-252/3574-25-8     | 131131 | 3600-7000 | 252 | 260 | 288 | 296 | 108 | .026 | .026 | .608 | .628 |
| F-252/3574-25-14    | 131271 | 3600-7200 | 252 | 260 | 288 | 296 | 114 | .026 | .026 | .608 | .628 |
| F-326-2             | 134261 | 3800-7400 | 252 | 262 | 326 | 336 | 110 | .022 | .024 | .554 | .554 |
| F-256/3634-25-8     | 131311 | 4000-7400 | 256 | 264 | 292 | 300 | 108 | .026 | .026 | .618 | .638 |
| F-290-2             | 134691 | 4000-7500 | 256 | 266 | 290 | 300 | 110 | .026 | .026 | .580 | .600 |
| F-290-2             | 134692 | 4000-7500 | 256 | 266 | 290 | 300 | 110 | .026 | .026 | .580 | .600 |
| F-260/3694-25-8     | 131441 | 4200-7600 | 260 | 268 | 296 | 304 | 108 | .026 | .026 | .628 | .648 |
| F-260/3694-25-14    | 131281 | 4200-7800 | 260 | 268 | 296 | 304 | 114 | .026 | .026 | .628 | .648 |
| 3959180             | 131141 | 4400-7200 | 262 | 272 |     |     | 110 | .024 | .026 | .575 | .615 |
| 3925535             | 968561 | 4400-7200 | 264 | 269 |     |     | 112 | .024 | .026 | .560 | .580 |
| F-310-2             | 134761 | 4400-7800 | 266 | 276 | 310 | 320 | 110 | .026 | .026 | .600 | .620 |
| F-310-2             | 134762 | 4400-7800 | 266 | 276 | 310 | 320 | 110 | .026 | .026 | .600 | .620 |
| F-266/3528-2-14     | 131151 | 4400-8000 | 266 | 276 | 302 | 312 | 114 | .026 | .026 | .600 | .620 |
| F-268/3814-25-8     | 131541 | 4600-7800 | 268 | 276 | 304 | 312 | 108 | .026 | .026 | .648 | .669 |
| F-270/3867-25-10    | 131161 | 4600-8000 | 270 | 276 | 300 | 312 | 110 | .012 | .026 | .657 | .620 |
| F-316-2             | 134771 | 4800-8000 | 272 | 280 | 316 | 324 | 110 | .026 | .026 | .659 | .679 |
| F-272/3874-25-14    | 131291 | 4600-8200 | 272 | 280 | 308 | 316 | 114 | .026 | .026 | .659 | .679 |
| F-276/3934-25-8     | 131641 | 4800-8200 | 276 | 284 | 312 | 320 | 108 | .026 | .026 | .669 | .689 |
| F-276/3934-25-8 SFO | 131171 | 4800-8200 | 276 | 284 | 312 | 320 | 108 | .026 | .026 | .669 | .689 |
| F-280/3994-25-10    | 131761 | 5000-8400 | 280 | 288 | 316 | 324 | 110 | .026 | .026 | .679 | .699 |
| F-280/3994-25-14    | 131181 | 5200-8400 | 280 | 288 | 316 | 324 | 114 | .026 | .026 | .679 | .699 |

**Mechanical Roller Camshafts**

|                     |        |           |     |     |     |     |     |      |      |      |      |
|---------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| SR-238/350-25-12 IG | 138551 | 2800-6600 | 238 | 246 | 288 | 296 | 112 | .020 | .020 | .595 | .615 |
| SR-246/362-25-10 IG | 138601 | 3000-6800 | 246 | 254 | 296 | 304 | 110 | .020 | .020 | .615 | .636 |
| SR-246/362-25-14 IG | 138781 | 3200-6800 | 246 | 254 | 296 | 304 | 114 | .020 | .020 | .615 | .636 |
| R-246/420-2-14 IG   | 138141 | 3200-7000 | 246 | 256 | 278 | 288 | 114 | .020 | .020 | .714 | .714 |
| R-250/420-25-10     | 138871 | 3200-7000 | 250 | 258 | 282 | 290 | 110 | .020 | .020 | .714 | .714 |
| SR-254/374-25-12 IG | 138631 | 3400-7200 | 254 | 262 | 304 | 312 | 112 | .020 | .020 | .636 | .636 |
| R-254/420-251-12 IG | 138101 | 3600-7200 | 254 | 262 | 286 | 294 | 112 | .020 | .020 | .714 | .714 |
| SR-254/374-25-14 IG | 138791 | 3600-7200 | 254 | 262 | 304 | 312 | 114 | .020 | .020 | .636 | .636 |
| R-254/420-2-10      | 138881 | 3800-7200 | 254 | 264 | 286 | 296 | 110 | .020 | .020 | .714 | .714 |
| R-258/420-251-14 IG | 138681 | 4000-7200 | 258 | 262 | 290 | 294 | 114 | .020 | .020 | .714 | .714 |
| R-258/420-25-8      | 138891 | 4000-7200 | 258 | 266 | 290 | 298 | 108 | .020 | .020 | .714 | .714 |

**Section Continued**



# Camshaft Quick Reference Guide

QUICK REFERENCE

| Grind Number  | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |  |
|---|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|--|
|   |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |  |
| <b>Chevrolet V-8 67-95 - 396-402-427-454 cu.in.</b> |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| <b>Mechanical Roller Camshafts</b>                  |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| SR-262/374-2S1-14 IG                                | 138641      | 4200-7400       | 262             | 270  | 312                 | 320  | 114       | .020       | .020 | .636             | .636 |  |
| R-262/420-2S1-14 IG                                 | 138131      | 4200-7600       | 262             | 270  | 294                 | 302  | 114       | .020       | .020 | .714             | .714 |  |
| R-262/420-2-6                                       | 138801      | 4200-7200       | 262             | 272  | 294                 | 304  | 106       | .020       | .020 | .714             | .714 |  |
| R-262/420-2-10                                      | 138811      | 4200-7400       | 262             | 272  | 294                 | 304  | 110       | .020       | .020 | .714             | .714 |  |
| R-268/420-2S-8                                      | 138831      | 4400-7600       | 268             | 272  | 300                 | 304  | 108       | .020       | .020 | .714             | .714 |  |
| R-268/420-2S-8 SFO                                  | 138671      | 4400-7600       | 268             | 272  | 300                 | 304  | 108       | .020       | .020 | .714             | .714 |  |
| R-270/420-2S2-14                                    | 138661      | 4400-7800       | 270             | 278  | 302                 | 310  | 114       | .020       | .020 | .714             | .714 |  |
| R-272/420-2S1-10                                    | 138841      | 4400-7800       | 272             | 278  | 304                 | 310  | 110       | .020       | .020 | .714             | .714 |  |
| R-274/4334-2S-10                                    | 138291      | 4600-8000       | 274             | 284  | 314                 | 324  | 110       | .026       | .026 | .737             | .726 |  |
| R-274/4334-2S-10 SFO                                | 138301      | 4600-8000       | 274             | 284  | 314                 | 324  | 110       | .026       | .026 | .737             | .726 |  |
| R-274/4334-2S-14                                    | 138351      | 4600-8200       | 274             | 284  | 314                 | 324  | 114       | .026       | .026 | .737             | .726 |  |
| R-274/4334-2S-14 SFO                                | 138361      | 4600-8200       | 274             | 284  | 314                 | 324  | 114       | .026       | .026 | .737             | .726 |  |
| R-274/5002-2S-14 SFO                                | 138931      | 4600-8600       | 274             | 300  | 304                 | 331  | 114       | .020       | .016 | .850             | .818 |  |
| R-276/420-2S1-14                                    | 138451      | 4600-8200       | 276             | 280  | 308                 | 312  | 114       | .020       | .020 | .714             | .714 |  |
| R-276/420-2S1-14 IG                                 | 138461      | 4600-8200       | 276             | 280  | 308                 | 312  | 114       | .020       | .020 | .714             | .714 |  |
| R-278/420-2S-10                                     | 138851      | 4600-8000       | 278             | 282  | 310                 | 314  | 110       | .020       | .020 | .714             | .714 |  |
| R-278/420-2-14 IG                                   | 138471      | 4600-8200       | 278             | 288  | 310                 | 320  | 114       | .020       | .020 | .714             | .714 |  |
| R-282/420-2-12                                      | 138861      | 4800-8200       | 282             | 292  | 314                 | 324  | 112       | .020       | .020 | .714             | .714 |  |
| R-282/490-2S2-13 SFO                                | 138941      | 4800-8600       | 282             | 304  | 318                 | 339  | 113       | .026       | .022 | .833             | .772 |  |
| R-282/5002-2S-10 SFO                                | 138711      | 5000-8200       | 282             | 286  | 312                 | 330  | 110       | .020       | .030 | .875             | .800 |  |
| R-284/456-2S1-10                                    | 138591      | 4800-8200       | 284             | 292  | 324                 | 332  | 110       | .026       | .026 | .775             | .723 |  |
| R-284/456-2S1-10 SFO                                | 138701      | 4800-8200       | 284             | 292  | 324                 | 332  | 110       | .026       | .026 | .775             | .723 |  |
| R-284/456-2S5-14                                    | 138391      | 5000-8400       | 284             | 296  | 324                 | 336  | 114       | .026       | .026 | .775             | .740 |  |
| R-284/456-2S5-14 SFO                                | 138401      | 5000-8400       | 284             | 296  | 324                 | 336  | 114       | .026       | .026 | .775             | .740 |  |
| R-286/490-2S1-14 SFO                                | 138771      | 5000-8000       | 286             | 306  | 326                 | 352  | 114       | .026       | .030 | .833             | .810 |  |
| R-286/500-2S3-16 SFO                                | 138951      | 5000-7600       | 286             | 298  | 326                 | 348  | 116       | .026       | .030 | .850             | .816 |  |
| R-286/5151-2S-16 SFO                                | 138961      | 6000-8400       | 286             | 310  | 320                 | 344  | 116       | .024       | .026 | .876             | .794 |  |
| 321-334-10R   | 19315       | 5000-8200       | 287             | 292  | 321                 | 334  | 110       | .030       | .030 | .723             | .714 |  |
| 333-344-14R   | 19333       | 5000-8400       | 287             | 297  | 333                 | 344  | 114       | .035       | .030 | .774             | .726 |  |
| R-288/5002-2S2-12 SFO                               | 138971      | 5000-8400       | 288             | 300  | 318                 | 332  | 112       | .020       | .022 | .850             | .850 |  |
| R-288/515-2S2-16 SFO                                | 138911      | 5000-8400       | 288             | 312  | 322                 | 352  | 116       | .024       | .030 | .876             | .800 |  |
| R-288/515-2S3-18 SFO                                | 138921      | 5200-8400       | 288             | 316  | 318                 | 348  | 118       | .020       | .022 | .876             | .850 |  |
| R-292/5152-2S-17 SFO 55J                            | 138981      | 5800-8600       | 292             | 310  | 322                 | 342  | 117       | .020       | .022 | .876             | .850 |  |

## Chevrolet V-8 96-00 - 454 (7.4L)-502 (8.2L) cu.in. Gen VI

|                                    |        |           |     |     |     |     |     |      |      |      |      |  |
|------------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|--|
| <b>Hydraulic Roller Camshafts</b>  |        |           |     |     |     |     |     |      |      |      |      |  |
| HR-204/286-2-12 IG                 | 168711 | 800-5000  | 204 | 214 | 260 | 270 | 112 | .000 | .000 | .486 | .512 |  |
| HR-214/325-2S-12 IG                | 168721 | 1200-5000 | 214 | 220 | 276 | 282 | 112 | .000 | .000 | .553 | .564 |  |
| HR-222/339-2S-12 IG                | 168781 | 1400-5400 | 222 | 230 | 284 | 292 | 112 | .000 | .000 | .576 | .598 |  |
| HR-226/345-2S-12 IG                | 168731 | 1600-5600 | 226 | 236 | 288 | 298 | 112 | .000 | .000 | .587 | .610 |  |
| HR-226/345-2S-14 IG                | 168791 | 1800-5800 | 226 | 236 | 288 | 298 | 114 | .000 | .000 | .587 | .610 |  |
| HR-230/352-2S-12 IG                | 168761 | 2000-5800 | 230 | 236 | 292 | 298 | 112 | .000 | .000 | .598 | .610 |  |
| HR-236/359-2S-10 IG                | 168801 | 2200-5800 | 236 | 244 | 298 | 306 | 110 | .000 | .000 | .610 | .632 |  |
| HR-236/359-2S-12 IG                | 168741 | 2200-6000 | 236 | 244 | 298 | 306 | 112 | .000 | .000 | .610 | .632 |  |
| HR-240/365-2S-14 IG                | 168771 | 2600-6200 | 240 | 248 | 302 | 310 | 114 | .000 | .000 | .621 | .632 |  |
| HR-242/372-2S-12 IG                | 168811 | 2800-6200 | 242 | 246 | 304 | 308 | 112 | .000 | .000 | .632 | .632 |  |
| HR-244/372-2S2-14 IG               | 169651 | 3000-6400 | 244 | 256 | 306 | 318 | 114 | .000 | .000 | .632 | .632 |  |
| HR-248/372-2S-14 IG                | 169691 | 3200-6400 | 248 | 256 | 310 | 318 | 114 | .000 | .000 | .632 | .632 |  |
| HR-254/400-2S2-10 IG               | 168831 | 3400-6600 | 254 | 262 | 324 | 332 | 110 | .000 | .000 | .680 | .680 |  |
| HR-254/400-2S4-14 IG               | 168841 | 3600-6800 | 254 | 262 | 324 | 332 | 114 | .000 | .000 | .680 | .680 |  |
| HR-262/400-2S-14 IG                | 168851 | 3800-6800 | 262 | 264 | 332 | 326 | 114 | .000 | .000 | .680 | .632 |  |
| HR-262/400-2S1-14 IG               | 169711 | 3800-7000 | 262 | 270 | 332 | 340 | 114 | .000 | .000 | .680 | .680 |  |
| <b>Mechanical Roller Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |  |
| SR-238/350-2S-12 IG                | 168551 | 2800-6600 | 238 | 246 | 288 | 296 | 112 | .020 | .020 | .595 | .615 |  |
| SR-246/362-2S-10 IG                | 168601 | 3000-6800 | 246 | 254 | 296 | 304 | 110 | .020 | .020 | .615 | .636 |  |
| SR-254/374-2S-12 IG                | 168631 | 3400-7200 | 254 | 262 | 304 | 312 | 112 | .020 | .020 | .636 | .636 |  |
| R-254/420-2S-12 IG                 | 168401 | 3600-7200 | 254 | 262 | 286 | 294 | 112 | .020 | .020 | .714 | .714 |  |
| R-264/420-2S-10 IG                 | 168411 | 4200-7400 | 264 | 270 | 296 | 302 | 110 | .020 | .020 | .714 | .714 |  |
| R-274/4334-2S-10 IG                | 168291 | 4600-8000 | 274 | 284 | 314 | 324 | 110 | .026 | .026 | .737 | .726 |  |
| R-274/4334-2S-14 IG                | 168351 | 4800-8200 | 274 | 284 | 314 | 324 | 114 | .026 | .026 | .737 | .726 |  |

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

**Chevrolet V-8 01-08 - 8.1 Litre L18 (Vortec 8100)**

| <b>Hydraulic Roller Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |
|-----------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-208/292-25-16 IG               | 268701 | 800-4600  | 208 | 214 | 264 | 270 | 116 | .000 | .000 | .496 | .512 |
| HR-216/325-25-14 IG               | 268711 | 1200-5000 | 214 | 220 | 276 | 241 | 114 | .000 | .000 | .553 | .564 |
| HR-222/339-25-12 IG               | 268721 | 1400-5400 | 222 | 230 | 284 | 292 | 112 | .000 | .000 | .576 | .598 |
| HR-226/345-25-14 IG               | 268731 | 1600-5600 | 226 | 234 | 288 | 296 | 114 | .000 | .000 | .587 | .610 |
| HR-230/352-25-14 IG               | 268761 | 1800-5800 | 230 | 236 | 292 | 298 | 114 | .000 | .000 | .598 | .610 |
| HR-236/359-25-14 IG               | 268741 | 2200-6000 | 236 | 244 | 298 | 306 | 114 | .000 | .000 | .610 | .632 |
| HR-240/365-25-12 IG               | 268771 | 2600-6200 | 240 | 248 | 302 | 310 | 112 | .000 | .000 | .621 | .632 |

**Chrysler/Dodge Neon 4 cyl. 95-05 - SOHC 4-V 2.0 Litre**

| <b>Hydraulic Roller Follower Camshafts</b> |          |           |     |     |     |     |     |      |      |      |      |
|--|----------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| CHR-242-25-6                               | 158-0010 | 1000-6500 | 196 | 200 | 242 | 250 | 106 | .000 | .000 | .335 | .315 |
| CHR-250-25R-8                              | 158-0012 | 1500-6800 | 204 | 200 | 250 | 250 | 108 | .000 | .000 | .355 | .315 |
| CHR-262-25R-8                              | 158-0014 | 2500-7500 | 216 | 212 | 262 | 262 | 108 | .000 | .000 | .355 | .345 |
| CHR-272-25-14                              | 158-0016 | 3000-7800 | 226 | 226 | 272 | 282 | 114 | .000 | .000 | .355 | .345 |
| CHR-232/400-25R-10                         | 158-0018 | 3200-8000 | 232 | 230 | 280 | 285 | 110 | .000 | .000 | .400 | .400 |
| CHR-236/440-25R-12                         | 158-0020 | 3500-8500 | 236 | 230 | 280 | 285 | 112 | .000 | .000 | .440 | .400 |

**Chrysler/Dodge Neon, PT Cruiser 4 cyl. 95-10 - DOHC 4-V 2.0 - 2.4 Litre**

| <b>Hydraulic Roller Follower Camshafts</b> |          |           |     |     |     |     |     |      |      |      |      |
|--|----------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| CHR-242-6                                  | 180-0010 | 1000-6500 | 200 | 200 | 242 | 242 | 106 | .000 | .000 | .354 | .354 |
| CHR-242-10                                 | 193-0010 | 1000-6500 | 200 | 200 | 242 | 242 | 110 | .000 | .000 | .354 | .354 |
| CHR-246-25R-6                              | 180-0014 | 1500-6800 | 204 | 196 | 246 | 238 | 106 | .000 | .000 | .364 | .345 |
| CHR-246-25R-10                             | 193-0014 | 1500-6800 | 204 | 196 | 246 | 238 | 110 | .000 | .000 | .364 | .364 |
| CHR-246-8                                  | 180-0012 | 1500-6800 | 204 | 204 | 246 | 246 | 108 | .000 | .000 | .364 | .364 |
| CHR-246-12                                 | 193-0012 | 1500-6800 | 204 | 204 | 246 | 246 | 112 | .000 | .000 | .364 | .364 |
| CHR-250-25R-6                              | 180-0015 | 2200-7500 | 208 | 204 | 250 | 246 | 106 | .000 | .000 | .374 | .364 |
| CHR-250-25R-6                              | 193-0015 | 2200-7500 | 208 | 204 | 250 | 246 | 106 | .000 | .000 | .374 | .364 |
| CHR-250-6                                  | 180-0016 | 2000-7200 | 208 | 208 | 250 | 250 | 106 | .000 | .000 | .374 | .374 |
| CHR-250-10                                 | 193-0016 | 2000-7200 | 208 | 208 | 250 | 250 | 110 | .000 | .000 | .374 | .374 |
| CHR-258-8                                  | 180-0018 | 2500-7500 | 216 | 216 | 258 | 258 | 108 | .000 | .000 | .394 | .394 |
| CHR-258-12                                 | 193-0018 | 2500-7500 | 216 | 216 | 258 | 258 | 112 | .000 | .000 | .394 | .394 |
| CHR-266-10                                 | 180-0020 | 2800-7800 | 224 | 224 | 266 | 266 | 110 | .000 | .000 | .413 | .413 |
| CHR-266-10                                 | 193-0020 | 2800-7800 | 224 | 224 | 266 | 266 | 110 | .000 | .000 | .413 | .413 |
| CHR-274-10                                 | 180-0022 | 3200-8000 | 232 | 232 | 274 | 274 | 110 | .000 | .000 | .433 | .433 |
| CHR-274-10                                 | 193-0022 | 3200-8000 | 232 | 232 | 274 | 274 | 110 | .000 | .000 | .433 | .433 |
| CHR-282-6                                  | 180-0024 | 3600-8200 | 240 | 240 | 282 | 282 | 106 | .000 | .000 | .453 | .453 |
| CHR-282-6                                  | 193-0024 | 3600-8200 | 240 | 240 | 282 | 282 | 106 | .000 | .000 | .453 | .453 |
| CHR-290-6                                  | 180-0026 | 4000-8600 | 248 | 248 | 290 | 290 | 106 | .000 | .000 | .472 | .472 |
| CHR-290-6                                  | 193-0026 | 4000-8600 | 248 | 248 | 290 | 290 | 106 | .000 | .000 | .472 | .472 |
| CHR-296-6                                  | 180-0028 | 4400-8800 | 256 | 256 | 296 | 296 | 106 | .000 | .000 | .492 | .492 |
| CHR-296-6                                  | 193-0028 | 4400-8800 | 256 | 256 | 296 | 296 | 106 | .000 | .000 | .492 | .492 |

**Chrysler Hemi V-8 51-56 - 301-221-354 cu. in.**

| <b>Hydraulic Roller Camshafts—Retrofit</b> |        |           |     |     |     |     |     |      |      |      |      |
|--|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-224/339-10                              | 539521 | 2000-6000 | 224 | 224 | 286 | 286 | 110 | .000 | .000 | .509 | .509 |
| HR-230/352-2-14                            | 539531 | 2600-6600 | 230 | 240 | 292 | 302 | 114 | .000 | .000 | .528 | .548 |
| HR-240/365-25-8                            | 539541 | 3200-6800 | 240 | 248 | 302 | 310 | 108 | .000 | .000 | .548 | .558 |

| <b>Mechanical Roller Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |
|------------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| SR-230/338-8                       | 538491 | 2200-6200 | 230 | 230 | 280 | 280 | 108 | .020 | .020 | .507 | .507 |
| SR-230/338-25-10                   | 538501 | 2200-6200 | 230 | 238 | 280 | 288 | 110 | .020 | .020 | .507 | .525 |
| SR-238/350-25-12                   | 538511 | 2800-6600 | 238 | 246 | 288 | 296 | 112 | .020 | .020 | .525 | .543 |
| SR-246/362-12                      | 538521 | 3200-7000 | 246 | 246 | 296 | 296 | 112 | .020 | .020 | .543 | .543 |
| R-278/458-10                       | 538701 | 6000-8600 | 278 | 278 | 310 | 310 | 110 | .020 | .022 | .687 | .687 |
| R-284/456-10                       | 538661 | 6000-9900 | 284 | 284 | 324 | 324 | 110 | .026 | .026 | .684 | .684 |
| R-285/410-8                        | 538711 |           | 285 | 285 | 328 | 328 | 108 | .026 | .028 | .615 | .615 |

**Chrysler Hemi V-8 57 - 58 - 392 cu. in.**

| <b>Hydraulic Roller Camshafts—Retrofit</b> |        |           |     |     |     |     |     |      |      |      |      |
|--|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-224/339-10                              | 549521 | 2000-6000 | 224 | 224 | 286 | 286 | 110 | .000 | .000 | .509 | .509 |
| HR-230/352-2-14                            | 549531 | 2600-6600 | 230 | 240 | 292 | 302 | 114 | .000 | .000 | .528 | .548 |
| HR-240/365-25-8                            | 549541 | 3200-6800 | 240 | 248 | 302 | 310 | 108 | .000 | .000 | .548 | .558 |

| <b>Mechanical Roller Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |
|------------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| SR-230/338-8                       | 548491 | 2200-6200 | 230 | 230 | 280 | 280 | 108 | .020 | .020 | .507 | .507 |
| SR-230/338-25-10                   | 548501 | 2200-6200 | 230 | 238 | 280 | 288 | 110 | .020 | .020 | .507 | .525 |
| SR-238/350-25-12                   | 548511 | 2800-6600 | 238 | 246 | 288 | 296 | 112 | .020 | .020 | .525 | .543 |
| SR-246/362-12                      | 548521 | 3200-7000 | 246 | 246 | 296 | 296 | 112 | .020 | .020 | .543 | .543 |
| R-278/458-10                       | 548701 | 6000-8600 | 278 | 278 | 310 | 310 | 110 | .020 | .022 | .687 | .687 |
| R-284/456-10                       | 548661 | 6000-9900 | 284 | 284 | 324 | 324 | 110 | .026 | .026 | .684 | .684 |
| R-285/410-8                        | 548711 |           | 285 | 285 | 328 | 328 | 108 | .026 | .028 | .615 | .615 |

# Camshaft Quick Reference Guide

QUICK REFERENCE

| Grind Number  | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |  |
|---|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|--|
|   |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |  |
| <b>Chrysler-Dodge-Plymouth "LA" V-8 64-87 - 273-340-360 (5.9L) and 67-86 318 (5.2L) cu.in</b>                   |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| <b>Hydraulic Lifter Camshafts</b>   |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| H-248-2   | 693971      | 800-4200        | 192             | 204  | 248                 | 260  | 112       | .000       | .000 | .400             | .427 |  |
| H-260-2   | 693901      | 1200-4800       | 204             | 216  | 260                 | 272  | 112       | .000       | .000 | .427             | .454 |  |
| H-260-2   | 693902      | 1200-4800       | 204             | 216  | 260                 | 272  | 112       | .000       | .000 | .427             | .454 |  |
| Z-268-2   | 693511      | 1200-5000       | 212             | 220  | 268                 | 276  | 112       | .000       | .000 | .459             | .480 |  |
| Z-268-2   | 693512      | 1200-5000       | 212             | 220  | 268                 | 276  | 112       | .000       | .000 | .459             | .480 |  |
| 272 H10   | 15005       | 1800-5200       | 216             | 216  | 272                 | 272  | 110       | .000       | .000 | .454             | .454 |  |
| 272 H10   | 150052      | 1800-5200       | 216             | 216  | 272                 | 272  | 110       | .000       | .000 | .454             | .454 |  |
| H-272-2   | 693941      | 1800-5400       | 216             | 228  | 272                 | 284  | 112       | .000       | .000 | .454             | .480 |  |
| H-272-2   | 693942      | 1800-5400       | 216             | 228  | 272                 | 284  | 112       | .000       | .000 | .454             | .480 |  |
| Z-276-2   | 693521      | 1800-5600       | 220             | 228  | 276                 | 284  | 110       | .000       | .000 | .480             | .501 |  |
| Z-276-2   | 693522      | 1800-5600       | 220             | 228  | 276                 | 284  | 110       | .000       | .000 | .480             | .501 |  |
| H-222/3200-6  | 690141      | 2200-5600       | 222             | 222  | 294                 | 294  | 106       | .000       | .000 | .480             | .480 |  |
| H-278-2   | 693801      | 2200-5800       | 222             | 234  | 278                 | 290  | 114       | .000       | .000 | .467             | .494 |  |
| H-278-2   | 693802      | 2200-5800       | 222             | 234  | 278                 | 290  | 114       | .000       | .000 | .467             | .494 |  |
| H-288-2   | 694301      | 2600-6000       | 226             | 230  | 288                 | 292  | 110       | .000       | .000 | .458             | .465 |  |
| H-288-2   | 694302      | 2600-6000       | 226             | 230  | 288                 | 292  | 110       | .000       | .000 | .458             | .465 |  |
| 284 H12   | 15006       | 3000-6200       | 228             | 228  | 284                 | 284  | 112       | .000       | .000 | .480             | .480 |  |
| 284 H12   | 150062      | 3000-6200       | 228             | 228  | 284                 | 284  | 112       | .000       | .000 | .480             | .480 |  |
| H-228/3200-2S-8   | 690591      | 3000-6200       | 228             | 234  | 284                 | 290  | 108       | .000       | .000 | .480             | .494 |  |
| H-232/3360-6  | 690221      | 3200-6400       | 232             | 232  | 304                 | 304  | 106       | .000       | .000 | .504             | .504 |  |
| H-302-2   | 694561      | 3200-6800       | 232             | 242  | 302                 | 312  | 114       | .000       | .000 | .504             | .528 |  |
| H-312-2   | 694571      | 3600-7000       | 242             | 252  | 312                 | 322  | 108       | .000       | .000 | .528             | .552 |  |
| H-244/3439-6  | 690711      | 3800-7000       | 244             | 244  | 300                 | 300  | 106       | .000       | .000 | .516             | .516 |  |
| H-252/3680-2-10   | 690241      | 4400-7200       | 252             | 262  | 324                 | 334  | 110       | .000       | .000 | .552             | .576 |  |
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| HR-204/286-2-12 IG  | 699601      | 800-4800        | 204             | 214  | 260                 | 270  | 112       | .000       | .000 | .429             | .452 |  |
| HR-214/325-2S-12 IG   | 699611      | 1400-5400       | 214             | 222  | 276                 | 284  | 112       | .000       | .000 | .488             | .509 |  |
| HR-222/339-2S-12 IG   | 699621      | 2000-6000       | 222             | 230  | 284                 | 292  | 112       | .000       | .000 | .509             | .528 |  |
| HR-226/345-2S1-10 IG  | 699651      | 2000-6000       | 226             | 230  | 288                 | 292  | 110       | .000       | .000 | .518             | .528 |  |
| HR-230/352-2S-12 IG   | 699631      | 2600-6600       | 230             | 238  | 292                 | 300  | 112       | .000       | .000 | .528             | .548 |  |
| HR-238/365-2S-8 IG  | 699661      | 2800-6800       | 238             | 246  | 300                 | 308  | 108       | .000       | .000 | .548             | .558 |  |
| HR-238/365-2S-14 IG   | 699641      | 3000-7000       | 238             | 246  | 300                 | 308  | 114       | .000       | .000 | .548             | .558 |  |
| HR-242/372-2-8 IG   | 699671      | 3200-7000       | 242             | 252  | 304                 | 314  | 108       | .000       | .000 | .558             | .558 |  |
| HR-246/372-2S-8 IG  | 699681      | 3400-7000       | 246             | 254  | 308                 | 316  | 108       | .000       | .000 | .558             | .558 |  |
| HR-252/372-2S-10 IG   | 699691      | 4000-7200       | 252             | 262  | 314                 | 324  | 110       | .000       | .000 | .558             | .558 |  |
| <b>Mechanical Lifter Camshafts</b>  |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| F-238/3200-2-14   | 691191      | 2600-6400       | 238             | 248  | 300                 | 310  | 114       | .022       | .022 | .480             | .500 |  |
| F-244/3454-2S-6   | 690921      | 3200-6800       | 244             | 252  | 280                 | 288  | 106       | .026       | .026 | .518             | .536 |  |
| F-248/3602-2-8  | 690911      | 3200-7000       | 248             | 258  | 284                 | 294  | 108       | .026       | .026 | .540             | .560 |  |
| F-256/383-2S-8  | 690931      | 3600-7400       | 256             | 260  | 312                 | 316  | 108       | .014       | .016 | .575             | .585 |  |
| F-258/3735-2-8  | 691381      | 3600-7200       | 258             | 268  | 294                 | 304  | 108       | .026       | .026 | .560             | .580 |  |
| F-262/394-2S-10   | 691391      | 3800-7600       | 262             | 264  | 294                 | 296  | 110       | .018       | .018 | .591             | .596 |  |
| F-268/3868-2-8  | 691561      | 4000-7600       | 268             | 278  | 304                 | 314  | 108       | .026       | .026 | .580             | .600 |  |
| F-274/412-2S-8  | 691571      | 4200-8000       | 274             | 288  | 306                 | 324  | 108       | .018       | .026 | .618             | .620 |  |
| F-278/4002-8  | 691701      | 4400-8000       | 278             | 278  | 314                 | 314  | 108       | .026       | .026 | .600             | .600 |  |
| F-288/4134-8  | 691951      | 5000-8400       | 288             | 288  | 324                 | 324  | 108       | .026       | .026 | .620             | .620 |  |
| <b>Mechanical Roller Camshafts</b>  |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| SR-238/350-2S-12 IG   | 698521      | 2800-6600       | 238             | 246  | 288                 | 296  | 112       | .020       | .020 | .525             | .543 |  |
| SR-246/362-2S-12 IG   | 698531      | 3200-7000       | 246             | 254  | 283                 | 290  | 112       | .020       | .020 | .543             | .561 |  |
| R-256/452-2S-10   | 698271      | 3800-7800       | 256             | 268  | 285                 | 297  | 110       | .020       | .022 | .746             | .746 |  |
| R-260/420-2S-8  | 698801      | 3800-7600       | 260             | 266  | 292                 | 298  | 108       | .020       | .020 | .630             | .630 |  |
| R-268/420-2S1-8   | 698821      | 4000-7800       | 268             | 276  | 300                 | 308  | 108       | .020       | .020 | .630             | .630 |  |
| R-272/420-2-8   | 698831      | 4200-8000       | 272             | 282  | 304                 | 314  | 108       | .020       | .020 | .630             | .630 |  |
| R-274/482-2S-8  | 698281      | 4200-8200       | 274             | 278  | 318                 | 334  | 108       | .016       | .030 | .723             | .735 |  |
| R-276/420-2-10  | 698841      | 4400-8200       | 276             | 286  | 308                 | 318  | 110       | .020       | .020 | .630             | .630 |  |
| R-280/452-2S-8  | 698291      | 5000-8600       | 280             | 288  | 309                 | 317  | 108       | .020       | .022 | .678             | .678 |  |
| R-284/4765-2S-8   | 698611      | 5200-9000       | 284             | 292  | 318                 | 326  | 108       | .035       | .030 | .715             | .688 |  |
| <b>Chrysler-Dodge-Plymouth "LA" V-8 86-91 - 86-91 318 (5.2L) and 87-91 360 (5.9L) cu.in. (except 91 Dakota)</b> |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| <b>Hydraulic Roller Camshafts</b>   |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| 2010  | 694101      | 800-4200        | 194             | 184  | 250                 | 240  | 107       | .000       | .000 | .407             | .384 |  |
| 2020  | 694111      | 1000-4600       | 204             | 194  | 260                 | 250  | 112       | .000       | .000 | .429             | .407 |  |
| HR-204/286-2S-14  | 699701      | 1000-4800       | 204             | 208  | 260                 | 250  | 114       | .000       | .000 | .429             | .438 |  |

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

### Chrysler-Dodge-Plymouth Magnum V-8 92-02 - 5.2-5.9 Litre

#### Hydraulic Roller Camshafts

|                   |        |           |     |     |     |     |     |      |      |      |      |
|-------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| 2020              | 704111 | 800-4600  | 194 | 204 | 250 | 260 | 112 | .000 | .000 | .434 | .458 |
| 2030              | 704121 | 1200-5200 | 204 | 208 | 260 | 264 | 114 | .000 | .000 | .458 | .467 |
| HR-208/292-2S1-10 | 708501 | 1600-5600 | 208 | 216 | 264 | 272 | 110 | .000 | .000 | .467 | .482 |
| HR-214/325-2S-14  | 708511 | 1800-5800 | 214 | 220 | 276 | 282 | 114 | .000 | .000 | .520 | .531 |
| HR-222/339-2S-14  | 708521 | 2200-6200 | 222 | 226 | 284 | 288 | 114 | .000 | .000 | .542 | .552 |

### Chrysler-Dodge V-8 03-10 - 5.7 - 6.1 Litre Hemi

#### Hydraulic Roller Camshafts

|                   |         |           |     |     |     |     |     |      |      |      |      |
|-------------------|---------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-208/297-2S-16  | 1989491 | 1000-5000 | 208 | 214 | 268 | 274 | 116 | .000 | .000 | .505 | .505 |
| HR-210/3236-2S-12 | 1989501 | 1200-5200 | 210 | 216 | 268 | 274 | 112 | .000 | .000 | .550 | .550 |
| HR-216/3236-2S-12 | 1989511 | 1800-5800 | 216 | 222 | 274 | 280 | 112 | .000 | .000 | .550 | .550 |
| HR-222/3236-2S-14 | 1989521 | 2200-6200 | 222 | 228 | 280 | 286 | 114 | .000 | .000 | .550 | .550 |

### Chrysler-Dodge-Plymouth "B" V-8 58-78 - 350-361-383-400-413-426-440 cu.in. with Single Bolt Gear

#### Hydraulic Lifter Camshafts

We are now offering only the 68-prefix three bolt camshafts for the Chrysler-Dodge-Plymouth "B" V-8 family of engines, due their superior reliability. The three bolt camshafts can be used in engines originally equipped with single bolt camshafts if the appropriate three bolt timing chain and gear set is used.

### Chrysler-Dodge-Plymouth "B" V-8 70-78 - 383-400-440 cu.in. with Three Bolt Gear

#### Hydraulic Lifter Camshafts

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-260-2          | 683901 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .427 | .454 |
| H-260-2          | 683902 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .427 | .454 |
| 2843564          | 680101 | 1400-5000 | 214 | 226 | 272 | 292 | 115 | .000 | .000 | .447 | .464 |
| H-272-2          | 683941 | 1600-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .454 | .480 |
| H-272-2          | 683942 | 1600-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .454 | .480 |
| H-222/3114-2S-12 | 680321 | 2400-6000 | 222 | 234 | 278 | 290 | 112 | .000 | .000 | .467 | .494 |
| H-278-2          | 683801 | 1800-5600 | 222 | 234 | 278 | 290 | 114 | .000 | .000 | .467 | .494 |
| H-278-2          | 683802 | 1800-5600 | 222 | 234 | 278 | 290 | 114 | .000 | .000 | .467 | .494 |
| H-286            | 684321 | 2200-6000 | 226 | 226 | 286 | 286 | 112 | .000 | .000 | .471 | .471 |
| H-228/3200-2S-8  | 680591 | 2600-6400 | 228 | 234 | 284 | 290 | 108 | .000 | .000 | .480 | .494 |
| H-302-2          | 684561 | 2800-6600 | 232 | 242 | 302 | 312 | 112 | .000 | .000 | .504 | .528 |
| H-236/348-2S-12  | 680601 | 3000-6800 | 236 | 244 | 292 | 300 | 112 | .000 | .000 | .522 | .543 |
| H-238/3347-6     | 680651 | 3000-6800 | 238 | 238 | 294 | 294 | 106 | .000 | .000 | .502 | .502 |
| H-312-2          | 684571 | 3200-7000 | 242 | 252 | 312 | 322 | 112 | .000 | .000 | .528 | .552 |
| H-242/3520-2-8   | 680701 | 3600-7200 | 242 | 252 | 314 | 324 | 108 | .000 | .000 | .528 | .552 |
| H-244/362-2S-12  | 680711 | 3800-7200 | 244 | 252 | 300 | 308 | 112 | .000 | .000 | .543 | .564 |
| H-248/369-2S-12  | 680721 | 4000-7200 | 248 | 256 | 304 | 312 | 112 | .000 | .000 | .554 | .575 |
| H-252/3680-2-8   | 680761 | 4000-7200 | 252 | 262 | 324 | 334 | 108 | .000 | .000 | .552 | .576 |

#### Hydraulic Roller Camshafts — Retrofit

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-204/286-2-12  | 689501 | 800-5200  | 204 | 214 | 260 | 270 | 112 | .022 | .022 | .429 | .452 |
| HR-214/325-2S-12 | 689511 | 1400-5600 | 214 | 222 | 276 | 284 | 112 | .000 | .000 | .488 | .509 |
| HR-222/339-2S-12 | 689521 | 1800-6000 | 222 | 230 | 284 | 292 | 112 | .000 | .000 | .509 | .528 |
| HR-230/352-2S-12 | 689531 | 2200-6400 | 230 | 236 | 292 | 298 | 112 | .000 | .000 | .528 | .539 |
| HR-234/359-2S-12 | 689551 | 2600-6600 | 234 | 242 | 296 | 304 | 112 | .000 | .000 | .539 | .558 |
| HR-240/365-2S-10 | 689561 | 2800-6600 | 240 | 248 | 302 | 310 | 110 | .000 | .000 | .548 | .558 |
| HR-240/365-2S-14 | 689541 | 3000-6800 | 240 | 248 | 302 | 310 | 114 | .000 | .000 | .548 | .558 |
| HR-248/372-2S-14 | 689571 | 3200-7000 | 248 | 256 | 310 | 318 | 114 | .000 | .000 | .558 | .558 |
| HR-254/400-2S-14 | 689701 | 3400-7000 | 254 | 262 | 324 | 332 | 114 | .000 | .000 | .600 | .600 |

#### Mechanical Lifter Camshafts

|                 |        |           |     |     |     |     |       |      |      |      |      |
|-----------------|--------|-----------|-----|-----|-----|-----|-------|------|------|------|------|
| F-238/3467-2-12 | 681201 | 2800-6600 | 238 | 248 | 284 | 294 | 112   | .028 | .022 | .520 | .540 |
| F-248/3334-2-12 | 681241 | 3200-7000 | 248 | 258 | 310 | 320 | 112   | .022 | .022 | .500 | .520 |
| F-248/3600-2-8  | 680931 | 3400-7000 | 248 | 258 | 284 | 294 | 108   | .028 | .030 | .540 | .560 |
| F-250/376-2S-12 | 680941 | 3600-7200 | 250 | 254 | 282 | 286 | 112   | .020 | .018 | .564 | .573 |
| 2402293         | 680201 | 3600-7200 | 256 | 256 | 304 | 304 | 112.5 | .028 | .032 | .504 | .504 |
| F-258/3468-8    | 681321 | 4000-7400 | 258 | 258 | 320 | 320 | 108   | .022 | .022 | .520 | .520 |
| F-268/3868-2-8  | 681561 | 4600-7800 | 268 | 278 | 304 | 314 | 108   | .026 | .026 | .580 | .600 |
| F-274/3933-8    | 681681 | 4800-8000 | 274 | 274 | 314 | 314 | 108   | .028 | .028 | .590 | .590 |
| F-278/4002-8    | 681701 | 5000-8200 | 278 | 278 | 314 | 314 | 108   | .026 | .026 | .600 | .600 |
| F-280/430-10    | 681721 | 5000-8400 | 280 | 280 | 320 | 320 | 110   | .018 | .018 | .645 | .645 |
| F-288/4134-6    | 681941 | 5200-8400 | 288 | 288 | 324 | 324 | 106   | .026 | .026 | .620 | .620 |

Section Continued

# Camshaft Quick Reference Guide

QUICK REFERENCE

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

## Chrysler-Dodge-Plymouth "B" V-8 70-78 - 383-400-440 cu.in. with Three Bolt Gear

### Mechanical Roller Camshafts

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| SR-246/362-2S-12 | 688521 | 3200-7200 | 246 | 254 | 296 | 304 | 112 | .020 | .020 | .543 | .561 |
| SR-254/374-2S-12 | 688531 | 3400-7200 | 254 | 258 | 304 | 308 | 112 | .020 | .020 | .561 | .561 |
| R-260/420-2S-8   | 688801 | 3800-7600 | 260 | 268 | 292 | 300 | 108 | .020 | .020 | .630 | .630 |
| R-268/420-2-8    | 688811 | 4000-7800 | 268 | 278 | 300 | 310 | 108 | .020 | .020 | .630 | .630 |
| R-272/420-2-10   | 688821 | 4200-8000 | 272 | 282 | 304 | 314 | 110 | .020 | .020 | .630 | .630 |
| R-274/454-2S-12  | 688651 | 4400-8200 | 274 | 278 | 306 | 310 | 112 | .020 | .022 | .681 | .693 |
| R-276/420-2-10   | 688831 | 4400-8400 | 276 | 286 | 308 | 318 | 110 | .020 | .020 | .630 | .630 |
| R-280/4468-8     | 688981 | 4600-8200 | 280 | 280 | 312 | 312 | 108 | .028 | .030 | .670 | .670 |
| R-280/450-2S4-10 | 688681 | 4600-8400 | 280 | 288 | 320 | 328 | 114 | .026 | .026 | .675 | .638 |
| R-282/420-2-10   | 688841 | 4800-8600 | 282 | 292 | 314 | 324 | 110 | .020 | .020 | .630 | .630 |
| R-284/456-6      | 688561 | 5000-8200 | 284 | 284 | 324 | 324 | 106 | .026 | .026 | .684 | .684 |
| R-286/500-2S3-14 | 688671 | 5000-8400 | 286 | 306 | 320 | 338 | 114 | .026 | .022 | .750 | .750 |

## Chrysler-Dodge-Plymouth V-8 "Hemi 426" 66-71

### Hydraulic Lifter Camshafts

|                 |        |           |     |     |     |     |     |      |      |      |      |
|-----------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-212/304-2-12  | 660091 | 1600-5200 | 212 | 222 | 284 | 294 | 112 | .000 | .000 | .477 | .486 |
| H-232/3360-2-12 | 660611 | 2600-6000 | 232 | 242 | 304 | 314 | 112 | .000 | .000 | .528 | .535 |
| H-236/348-2S-12 | 660621 | 2800-6200 | 236 | 244 | 292 | 300 | 112 | .000 | .000 | .546 | .550 |
| H-244/362-2S-14 | 660631 | 3200-6600 | 244 | 252 | 300 | 308 | 114 | .000 | .000 | .568 | .572 |

### Hydraulic Roller Camshafts — Retrofit

|                   |        |           |     |     |     |     |     |      |      |      |      |
|-------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-226/345-2S1-12 | 669521 | 2200-6200 | 226 | 230 | 288 | 292 | 112 | .000 | .000 | .542 | .535 |
| HR-236/359-2S-12  | 669531 | 2600-6600 | 236 | 240 | 298 | 302 | 112 | .000 | .000 | .564 | .555 |
| HR-244/372-2S-14  | 669541 | 3000-6800 | 244 | 248 | 306 | 310 | 114 | .000 | .000 | .584 | .565 |
| HR-254/400-2S-14  | 669571 | 3400-7000 | 254 | 258 | 324 | 328 | 114 | .000 | .000 | .628 | .608 |
| HR-262/400-2S-14  | 669561 | 3600-7000 | 262 | 266 | 332 | 336 | 114 | .000 | .000 | .628 | .608 |

## Chrysler-Dodge-Plymouth V-8 "Hemi 426" 66-71 -

Also: Johnson/Rodeck TFX-92. Brad Anderson aluminum. Keith Black aluminum. Milodon VII litre. and JP-1

### Mechanical Lifter Camshafts

|                 |        |           |     |     |     |     |     |      |      |      |      |
|-----------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| F-238/3200-2-12 | 661201 | 2800-6400 | 238 | 248 | 300 | 310 | 112 | .022 | .022 | .502 | .507 |
| F-248/3600-2-12 | 660941 | 3600-7000 | 248 | 258 | 294 | 304 | 112 | .028 | .030 | .565 | .568 |
| F-260/391-2S-10 | 661381 | 4000-7200 | 260 | 264 | 292 | 296 | 110 | .018 | .018 | .614 | .603 |

### Mechanical Roller Camshafts

|                           |        |            |     |     |     |     |     |      |      |      |      |
|---------------------------|--------|------------|-----|-----|-----|-----|-----|------|------|------|------|
| SR-238/350-2S-12          | 668511 | 3000-7000  | 238 | 246 | 288 | 296 | 112 | .020 | .020 | .550 | .550 |
| SR-246/362-2S-12          | 668521 | 3200-7200  | 246 | 254 | 296 | 304 | 112 | .020 | .020 | .568 | .568 |
| SR-254/374-2S-12          | 668531 | 3600-7600  | 254 | 262 | 304 | 312 | 112 | .020 | .020 | .587 | .568 |
| SR-262/400-2S-12          | 668541 | 3800-7600  | 262 | 266 | 300 | 304 | 112 | .020 | .020 | .628 | .608 |
| R-262/452-2S-12           | 668301 | 4000-7800  | 262 | 276 | 291 | 312 | 112 | .020 | .026 | .710 | .699 |
| R-274/4334-8              | 668281 | 4400-8000  | 274 | 274 | 314 | 314 | 108 | .026 | .026 | .680 | .659 |
| R-276/5401-2S-13XBB 48D   | 668821 | 4000-6800  | 276 | 282 | 305 | 311 | 113 | .020 | .022 | .848 | .821 |
| R-276/555-2S-13XBBA SFO   | 668351 | 5500-8500  | 276 | 294 | 306 | 324 | 113 | .020 | .022 | .871 | .798 |
| 320-324-12R               | 668951 | 4400-8400  | 284 | 286 | 320 | 324 | 112 | .028 | .030 | .785 | .760 |
| R-292/480-10XBB 48D       | 668311 | 5000-8500  | 292 | 292 | 332 | 332 | 110 | .026 | .026 | .754 | .730 |
| R-292/500-2S4-14XBBA 48D  | 668321 | 5500-9500  | 292 | 296 | 332 | 336 | 114 | .026 | .026 | .785 | .760 |
| R-296/4778-8              | 669091 | 4600-8600  | 296 | 296 | 328 | 328 | 108 | .024 | .026 | .750 | .726 |
| R-296/4778-2S-14          | 669101 | 6000-10000 | 296 | 300 | 328 | 322 | 114 | .024 | .026 | .750 | .775 |
| R-296/4778-2S-14XBBA 48D  | 669161 | 6000-10000 | 296 | 300 | 328 | 322 | 114 | .024 | .026 | .750 | .775 |
| R-296/500-16              | 669121 | 6000-9600  | 296 | 296 | 336 | 336 | 116 | .026 | .026 | .785 | .760 |
| R-296/500-16 48D          | 669131 | 6000-9600  | 296 | 296 | 336 | 336 | 116 | .026 | .026 | .785 | .760 |
| R-296/500-16 XBBA 48D     | 669171 | 6000-9600  | 296 | 296 | 336 | 336 | 116 | .026 | .026 | .785 | .760 |
| R-296/5001-16XBBA 48D SFO | 668331 | 6000-9600  | 296 | 296 | 330 | 330 | 116 | .020 | .022 | .785 | .760 |
| R-298/4778-14XBB 48D      | 669181 | 5000-8600  | 298 | 298 | 330 | 330 | 114 | .026 | .026 | .750 | .726 |
| R-302/500-2SR-14XBB 48D   | 668341 | 5000-8600  | 302 | 298 | 342 | 338 | 114 | .026 | .026 | .785 | .760 |

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

### Ford 4 Cylinder 74-87 - 2300 c.c. (2.3L) OHC and 83-87 2000 c.c. OHC

| <b>Hydraulic Follower Camshafts</b>  |        |           |     |     |     |     |     |      |      |      |      |
|--------------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-260-2                              | 190021 | 1400-4600 | 212 | 220 | 260 | 268 | 112 | .000 | .000 | .415 | .425 |
| H-270                                | 194611 | 1400-4600 | 218 | 218 | 270 | 270 | 113 | .000 | .000 | .415 | .415 |
| H-272-2                              | 194621 | 1800-5200 | 226 | 234 | 272 | 280 | 110 | .000 | .000 | .420 | .420 |
| H-278-2                              | 190071 | 2400-5600 | 234 | 242 | 278 | 286 | 110 | .000 | .000 | .460 | .480 |
| <b>Mechanical Follower Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |
| FOR-272-2-10                         | 192211 | 2500-6000 | 232 | 242 | 272 | 282 | 110 | .008 | .008 | .435 | .460 |
| FOR-300-6                            | 192251 | 3200-7000 | 264 | 264 | 300 | 300 | 106 | .010 | .010 | .510 | .510 |
| FOR-300-8                            | 192221 | 3400-7200 | 264 | 264 | 300 | 300 | 108 | .010 | .010 | .510 | .510 |
| FOR-310-2R-8                         | 192261 | 4200-8200 | 274 | 264 | 310 | 300 | 108 | .010 | .010 | .535 | .510 |
| FOR-310-8                            | 192241 | 4000-7600 | 274 | 274 | 310 | 310 | 108 | .010 | .010 | .535 | .535 |
| FOR-320-10                           | 192231 | 4600-8400 | 284 | 284 | 320 | 320 | 110 | .010 | .010 | .560 | .560 |

### Ford 4 Cylinder 88-98 - 2300 c.c. (2.3L) OHC

| <b>Hydraulic Roller Camshafts</b>  |        |           |     |     |     |     |     |      |      |      |      |
|------------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| RFOR-214/420-12                    | 199541 | 1000-4200 | 214 | 214 | 252 | 252 | 112 | .000 | .000 | .420 | .420 |
| RFOR-226/420-25-12                 | 199501 | 1400-4600 | 226 | 234 | 274 | 282 | 112 | .000 | .000 | .420 | .420 |
| RFOR-234/450-8                     | 199511 | 2000-5600 | 234 | 234 | 282 | 282 | 108 | .000 | .000 | .450 | .450 |
| RFOR-242/480-8                     | 199521 | 2800-6600 | 242 | 242 | 290 | 290 | 108 | .000 | .000 | .480 | .480 |
| RFOR-250/510-10                    | 199531 | 3200-7000 | 250 | 250 | 298 | 298 | 110 | .000 | .000 | .510 | .510 |
| <b>Mechanical Roller Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |
| RFOR-252/560-6                     | 198091 | 3200-7000 | 252 | 252 | 284 | 284 | 106 | .010 | .012 | .560 | .560 |
| RFOR-260/584-8                     | 198101 | 3600-7400 | 260 | 260 | 292 | 292 | 108 | .010 | .012 | .584 | .584 |
| RFOR-268/608-6                     | 198131 | 4000-7800 | 268 | 268 | 300 | 300 | 106 | .010 | .012 | .608 | .608 |
| RFOR-276/632-8                     | 198161 | 4600-8400 | 276 | 276 | 308 | 308 | 108 | .010 | .012 | .632 | .632 |

### Ford Zetec 4 Cylinder 95-02 - 2.0 Litre DOHC 4V

| <b>Mechanical Lifter Camshafts</b> |          |           |     |     |     |     |     |      |      |      |      |
|------------------------------------|----------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| F-210/374-2SR-10                   | 223-0010 | 1000-6500 | 210 | 206 | 232 | 228 | 110 | .008 | .010 | .374 | .366 |
| F-214/382-2SR-9                    | 223-0012 | 2000-7000 | 214 | 210 | 236 | 232 | 109 | .008 | .010 | .382 | .374 |
| F-218/390-2SR-10                   | 223-0014 | 3000-8000 | 218 | 214 | 240 | 236 | 110 | .008 | .010 | .390 | .382 |

### Ford Duratec 4 Cylinder 02-05 - 1.8-2.0-2.3 Litre DOHC 4V

| <b>Mechanical Lifter Camshafts</b> |          |           |     |     |     |     |     |      |      |      |      |
|------------------------------------|----------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| F-212/354-2SR-10                   | 224-0010 | 1000-6000 | 212 | 204 | 232 | 224 | 110 | .010 | .012 | .374 | .354 |
| F-226/410-2SR-10                   | 224-0012 | 1500-6500 | 226 | 216 | 248 | 238 | 110 | .008 | .010 | .410 | .385 |
| F-236/435-2SR-10                   | 224-0014 | 2500-7500 | 236 | 226 | 258 | 248 | 110 | .008 | .010 | .435 | .410 |
| F-246/460-2SR-10                   | 224-0016 | 3500-8000 | 246 | 236 | 268 | 258 | 110 | .008 | .010 | .460 | .435 |
| F-256/485-2SR-10                   | 224-0018 | 4500-9000 | 256 | 246 | 278 | 268 | 110 | .008 | .010 | .485 | .460 |

### Ford 6 Cylinder 65-96 - 240-300 (4.9L) cu.in.

| <b>Hydraulic Lifter Camshafts</b>  |        |           |     |     |     |     |     |      |      |      |      |
|------------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-192/2667-2S-12                   | 500511 | 800-4200  | 192 | 204 | 248 | 260 | 112 | .000 | .000 | .429 | .458 |
| H-260-2                            | 503901 | 1200-4600 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .458 | .487 |
| H-272-2                            | 503941 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .487 | .515 |
| H-224/309-2-6                      | 500211 | 2200-5600 | 224 | 234 | 288 | 298 | 106 | .000 | .000 | .497 | .523 |
| H-238/3347-8                       | 500641 | 3200-6400 | 238 | 238 | 294 | 294 | 108 | .000 | .000 | .539 | .539 |
| <b>Mechanical Lifter Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |
| F-238/3200-2-10                    | 501181 | 2600-6000 | 238 | 248 | 304 | 314 | 110 | .022 | .022 | .515 | .537 |
| F-246/359-2S-6                     | 501211 | 3000-6200 | 246 | 250 | 282 | 286 | 106 | .012 | .012 | .578 | .589 |
| F-256/3634-2S-8                    | 501311 | 3600-6800 | 256 | 264 | 292 | 300 | 108 | .026 | .026 | .585 | .604 |

# Camshaft Quick Reference Guide

QUICK REFERENCE

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

## Ford-Mercury V-8 62-87 - 221-255 (4.2L)-260-289-302 (5.0L) cu.in. and 88-95 302 cu.in. trucks (exc. 82-95 302 [5.0L] HO)

### Hydraulic Lifter Camshafts

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| 2021             | 364112 | 800-4200  | 190 | 198 | 252 | 260 | 109 | .000 | .000 | .416 | .432 |
| 260 H10          | 13003  | 1200-4600 | 204 | 204 | 260 | 260 | 110 | .000 | .000 | .456 | .456 |
| 260 H10          | 130032 | 1200-4600 | 204 | 204 | 260 | 260 | 110 | .000 | .000 | .456 | .456 |
| H-260-2          | 363901 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .456 | .484 |
| H-260-2          | 363902 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .456 | .484 |
| Z-256-2          | 363501 | 1200-5000 | 206 | 212 | 256 | 262 | 112 | .000 | .000 | .461 | .475 |
| Z-256-2          | 363502 | 1200-5000 | 206 | 212 | 256 | 262 | 112 | .000 | .000 | .461 | .475 |
| 266 H10          | 13004  | 1400-4800 | 210 | 210 | 266 | 266 | 110 | .000 | .000 | .469 | .469 |
| 266 H10          | 130042 | 1400-4800 | 210 | 210 | 266 | 266 | 110 | .000 | .000 | .469 | .469 |
| H-266-2          | 363931 | 1400-5200 | 210 | 218 | 266 | 274 | 114 | .000 | .000 | .456 | .472 |
| H-266-2          | 363932 | 1400-5200 | 210 | 218 | 266 | 274 | 114 | .000 | .000 | .456 | .472 |
| 272 H10          | 13005  | 1600-5200 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .484 | .484 |
| 272 H10          | 130052 | 1600-5200 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .484 | .484 |
| H-272-2          | 363941 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .484 | .512 |
| H-272-2          | 363942 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .484 | .512 |
| Z-268-2          | 363511 | 1800-5600 | 218 | 224 | 268 | 274 | 112 | .000 | .000 | .490 | .504 |
| Z-268-2          | 363512 | 1800-5600 | 218 | 224 | 268 | 274 | 112 | .000 | .000 | .490 | .504 |
| 278 H10          | 13009  | 2200-5600 | 222 | 222 | 278 | 278 | 110 | .000 | .000 | .498 | .498 |
| 278 H10          | 130092 | 2200-5600 | 222 | 222 | 278 | 278 | 110 | .000 | .000 | .498 | .498 |
| H-222/3114-251-6 | 360331 | 2200-5400 | 222 | 228 | 278 | 284 | 106 | .000 | .000 | .498 | .512 |
| H-278-2          | 363801 | 2200-5800 | 222 | 234 | 278 | 290 | 114 | .000 | .000 | .498 | .527 |
| H-278-2          | 363802 | 2200-5800 | 222 | 234 | 278 | 290 | 114 | .000 | .000 | .498 | .527 |
| Z-274-2          | 363521 | 2200-6000 | 224 | 230 | 274 | 280 | 110 | .000 | .000 | .504 | .518 |
| Z-274-2          | 363522 | 2200-6000 | 224 | 230 | 274 | 280 | 110 | .000 | .000 | .504 | .518 |
| H-288            | 364381 | 2400-6000 | 226 | 226 | 288 | 288 | 108 | .000 | .000 | .488 | .488 |
| H-288            | 364382 | 2400-6000 | 226 | 226 | 288 | 288 | 108 | .000 | .000 | .488 | .488 |
| H-286-2          | 364551 | 2600-6200 | 226 | 236 | 286 | 296 | 110 | .000 | .000 | .502 | .520 |
| H-286-2          | 364552 | 2600-6200 | 226 | 236 | 286 | 296 | 110 | .000 | .000 | .502 | .520 |
| 284 H12          | 13006  | 2800-6200 | 228 | 228 | 284 | 284 | 112 | .000 | .000 | .512 | .512 |
| 284 H12          | 130062 | 2800-6200 | 228 | 228 | 284 | 284 | 112 | .000 | .000 | .512 | .512 |
| H-296-2          | 364561 | 3200-6800 | 236 | 240 | 296 | 300 | 110 | .000 | .000 | .520 | .526 |
| H-296-2          | 364562 | 3200-6800 | 236 | 240 | 296 | 300 | 110 | .000 | .000 | .520 | .526 |

### Hydraulic Roller Camshafts — Retrofit

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| 2020             | 364211 | 800-4600  | 198 | 208 | 260 | 270 | 112 | .000 | .000 | .445 | .470 |
| HR-216/325-2S-12 | 369541 | 1800-5600 | 216 | 224 | 278 | 286 | 112 | .000 | .000 | .520 | .542 |
| HR-224/339-2S-12 | 369601 | 2400-6400 | 224 | 232 | 286 | 294 | 112 | .000 | .000 | .542 | .563 |

### Mechanical Lifter Camshafts

|                 |        |           |     |     |     |     |     |      |      |      |      |
|-----------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| F-278-2         | 363841 | 2800-6600 | 238 | 248 | 278 | 288 | 114 | .022 | .022 | .512 | .533 |
| F-280-2         | 364681 | 3200-7000 | 244 | 252 | 280 | 288 | 108 | .026 | .026 | .553 | .572 |
| F-280-2         | 364682 | 3200-7000 | 244 | 252 | 280 | 288 | 108 | .026 | .026 | .553 | .572 |
| F-310-2         | 364761 | 3600-7400 | 248 | 258 | 310 | 320 | 108 | .022 | .022 | .533 | .555 |
| F-260/3694-6    | 361421 | 4400-7800 | 260 | 260 | 296 | 296 | 106 | .026 | .026 | .591 | .591 |
| F-268/394-2S2-8 | 361591 | 4800-8200 | 268 | 272 | 304 | 302 | 108 | .018 | .012 | .630 | .640 |

### Mechanical Roller Camshafts

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| SR-238/350-2S-12 | 368511 | 2800-6600 | 238 | 246 | 288 | 296 | 112 | .020 | .020 | .560 | .579 |
| SR-246/362-2S-10 | 368601 | 3400-7000 | 246 | 254 | 296 | 304 | 110 | .020 | .020 | .579 | .598 |
| R-252/420-2S-8   | 448801 | 3600-7400 | 252 | 258 | 284 | 290 | 108 | .020 | .020 | .672 | .672 |
| R-258/420-2S-8   | 448831 | 3800-7600 | 258 | 262 | 290 | 294 | 108 | .020 | .020 | .672 | .672 |
| R-262/420-2S3-8  | 448841 | 4200-7800 | 262 | 268 | 294 | 300 | 108 | .020 | .020 | .672 | .672 |
| R-268/420-2S1-8  | 448851 | 4800-8200 | 268 | 272 | 300 | 304 | 108 | .020 | .020 | .672 | .672 |



| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

### Ford-Mercury V-8 85-95 - 5.0 Litre (302) H.O.

#### Hydraulic Roller Camshafts

|                   |        |           |     |     |     |     |     |      |      |      |      |
|-------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| 2020              | 444211 | 1000-5000 | 208 | 216 | 262 | 270 | 112 | .000 | .000 | .530 | .530 |
| 2020              | 444212 | 1000-5000 | 208 | 216 | 262 | 270 | 112 | .000 | .000 | .530 | .530 |
| 2031              | 444225 | 1400-5400 | 214 | 220 | 276 | 282 | 112 | .000 | .000 | .513 | .529 |
| 2031              | 444226 | 1400-5400 | 214 | 220 | 276 | 282 | 112 | .000 | .000 | .513 | .529 |
| 2030              | 444221 | 1400-5400 | 216 | 220 | 270 | 278 | 112 | .000 | .000 | .533 | .544 |
| 2030              | 444222 | 1400-5400 | 216 | 220 | 270 | 278 | 112 | .000 | .000 | .533 | .544 |
| HR-216/325-25-12  | 449541 | 1400-5400 | 216 | 224 | 278 | 286 | 112 | .000 | .000 | .520 | .542 |
| 2040              | 444231 | 1800-5800 | 220 | 220 | 282 | 282 | 110 | .000 | .000 | .498 | .498 |
| HR-220/311-25-14  | 449591 | 2000-6000 | 220 | 226 | 282 | 288 | 114 | .000 | .000 | .529 | .544 |
| HR-220/332-252-14 | 449631 | 2000-6200 | 220 | 228 | 282 | 290 | 114 | .000 | .000 | .531 | .552 |
| HR-224/339-12     | 449661 | 2200-6000 | 224 | 224 | 286 | 286 | 112 | .000 | .000 | .542 | .542 |
| HR-224/339-252-12 | 449671 | 2200-6200 | 224 | 232 | 286 | 294 | 112 | .000 | .000 | .576 | .559 |
| HR-224/339-25-12  | 449601 | 2400-6400 | 224 | 232 | 286 | 294 | 112 | .000 | .000 | .542 | .563 |
| HR-226/320-25-14  | 449651 | 2600-6600 | 226 | 232 | 288 | 294 | 114 | .000 | .000 | .544 | .559 |
| HR-228/345-251-14 | 449681 | 2600-6600 | 228 | 232 | 290 | 294 | 114 | .000 | .000 | .552 | .563 |
| HR-228/345-25-14  | 449691 | 2600-6600 | 228 | 236 | 290 | 298 | 114 | .000 | .000 | .552 | .574 |
| HR-232/352-25-12  | 449761 | 2800-6800 | 232 | 244 | 294 | 306 | 112 | .000 | .000 | .563 | .595 |
| HR-236/359-25-10  | 449641 | 2800-6800 | 236 | 244 | 298 | 306 | 110 | .000 | .000 | .574 | .595 |
| HR-236/359-25-14  | 449811 | 3000-7000 | 236 | 244 | 298 | 306 | 114 | .000 | .000 | .574 | .595 |
| HR-240/365-251-14 | 449711 | 3200-7000 | 240 | 244 | 302 | 306 | 114 | .000 | .000 | .584 | .595 |
| HR-244/372-25-10  | 449581 | 3400-7000 | 244 | 256 | 306 | 318 | 110 | .000 | .000 | .595 | .595 |
| HR-244/372-25-12  | 449571 | 3600-7000 | 244 | 256 | 306 | 318 | 112 | .000 | .000 | .595 | .595 |
| HR-252/400-25-14  | 449741 | 3800-7200 | 252 | 260 | 322 | 330 | 114 | .000 | .000 | .640 | .640 |

### Ford-Mercury V-8 69-93 - 351 (5.8L) Windsor and 82-84 302 (5.0) H.O., also: 302 SVO and 351 SVO

#### Hydraulic Lifter Camshafts

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-192/2667-25-10 | 440501 | 800-4200  | 192 | 204 | 248 | 260 | 110 | .000 | .000 | .427 | .456 |
| H-260-2          | 443901 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .456 | .484 |
| H-260-2          | 443902 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .456 | .484 |
| 2030             | 444232 | 1400-5200 | 206 | 214 | 268 | 276 | 114 | .000 | .000 | .448 | .464 |
| Z-256-2          | 443501 | 1200-5000 | 206 | 212 | 256 | 262 | 112 | .000 | .000 | .461 | .475 |
| Z-256-2          | 443502 | 1200-5000 | 206 | 212 | 256 | 262 | 112 | .000 | .000 | .461 | .475 |
| 272 H10          | 18005  | 1600-5200 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .484 | .484 |
| 272 H10          | 180052 | 1600-5200 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .484 | .484 |
| H-272-2          | 443941 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .484 | .512 |
| H-272-2          | 443942 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .484 | .512 |
| Z-268-2          | 443511 | 1800-5600 | 218 | 224 | 268 | 274 | 112 | .000 | .000 | .490 | .504 |
| Z-268-2          | 443512 | 1800-5600 | 218 | 224 | 268 | 274 | 112 | .000 | .000 | .490 | .504 |
| H-220/307-2-10   | 440131 | 2400-5800 | 220 | 230 | 280 | 290 | 110 | .000 | .000 | .491 | .509 |
| H-222/3114-10    | 440211 | 2600-6000 | 222 | 222 | 278 | 278 | 110 | .000 | .000 | .498 | .498 |
| H-224/315-251-10 | 440221 | 2800-6200 | 224 | 230 | 274 | 280 | 110 | .000 | .000 | .504 | .518 |
| H-226/314-2-10   | 440141 | 2800-6200 | 226 | 236 | 286 | 296 | 110 | .000 | .000 | .502 | .520 |
| H-286-2          | 444551 | 2800-6600 | 226 | 236 | 286 | 296 | 112 | .000 | .000 | .502 | .520 |
| H-286-2          | 444552 | 2800-6600 | 226 | 236 | 286 | 296 | 112 | .000 | .000 | .502 | .520 |
| H-228/3200-6     | 440551 | 2800-6400 | 228 | 228 | 284 | 284 | 106 | .000 | .000 | .512 | .512 |
| H-230/318-2-8    | 440151 | 3000-6600 | 230 | 240 | 290 | 300 | 108 | .000 | .000 | .509 | .526 |
| H-234/3294-25-10 | 440161 | 3200-6800 | 234 | 238 | 290 | 294 | 110 | .000 | .000 | .527 | .536 |
| H-236/325-25-10  | 440171 | 3400-7000 | 236 | 240 | 296 | 300 | 110 | .000 | .000 | .520 | .526 |
| H-236/325-25-14  | 440231 | 3400-7200 | 236 | 240 | 296 | 300 | 114 | .000 | .000 | .520 | .526 |
| H-238/3347-2-10  | 440661 | 3400-7200 | 238 | 248 | 294 | 304 | 110 | .000 | .000 | .536 | .560 |
| H-242/310-6      | 440241 | 3400-7000 | 242 | 242 | 300 | 300 | 106 | .000 | .000 | .496 | .496 |
| H-246/3334-6     | 440181 | 3600-7200 | 246 | 246 | 306 | 306 | 106 | .000 | .000 | .533 | .533 |
| H-246/336-25-8   | 440191 | 3800-7200 | 246 | 254 | 306 | 314 | 108 | .000 | .000 | .538 | .550 |
| H-260/360-25-8   | 440201 | 4200-7200 | 260 | 268 | 330 | 338 | 108 | .000 | .000 | .576 | .595 |

#### Hydraulic Roller Camshafts — Retrofit

|                   |        |           |     |     |     |     |     |      |      |      |      |
|-------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| 2020              | 444211 | 800-4800  | 208 | 216 | 262 | 270 | 112 | .000 | .000 | .530 | .530 |
| 2020              | 444212 | 800-4800  | 208 | 216 | 262 | 270 | 112 | .000 | .000 | .530 | .530 |
| HR-216/325-25-12  | 449541 | 1400-5400 | 216 | 224 | 278 | 286 | 112 | .000 | .000 | .520 | .542 |
| HR-220/332-252-14 | 449631 | 1600-5600 | 220 | 228 | 282 | 290 | 114 | .000 | .000 | .531 | .552 |
| HR-224/339-25-12  | 449601 | 1800-5800 | 224 | 232 | 286 | 294 | 112 | .000 | .000 | .542 | .563 |
| HR-228/345-251-14 | 449681 | 2400-6400 | 228 | 232 | 290 | 294 | 114 | .000 | .000 | .552 | .563 |
| HR-232/352-251-12 | 449561 | 2600-6600 | 232 | 240 | 294 | 302 | 112 | .000 | .000 | .563 | .584 |
| HR-236/359-25-10  | 449641 | 2800-6800 | 236 | 244 | 298 | 306 | 110 | .000 | .000 | .574 | .595 |
| HR-240/365-251-14 | 449711 | 3000-7000 | 240 | 244 | 302 | 306 | 114 | .000 | .000 | .584 | .595 |
| HR-244/372-25-12  | 449571 | 3200-7000 | 244 | 256 | 306 | 318 | 112 | .000 | .000 | .595 | .595 |
| HR-252/400-25-14  | 449741 | 3600-7200 | 252 | 260 | 322 | 330 | 114 | .000 | .000 | .640 | .640 |

Section Continued

866-388-5120 • 386-236-9983 FAX



# Camshaft Quick Reference Guide

QUICK REFERENCE

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

## Ford-Mercury V-8 69-93 - 351 (5.8L) Windsor and 82-84 302 (5.0) H.O., also: 302 SVO and 351 SVO

### Mechanical Lifter Camshafts

|                   |        |           |     |     |     |     |     |      |      |      |      |
|-------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| F-238/3200-8      | 441161 | 2800-6600 | 238 | 238 | 300 | 300 | 108 | .022 | .022 | .512 | .512 |
| F-246/3467-2S2-6  | 440881 | 3200-6800 | 246 | 250 | 278 | 282 | 106 | .012 | .012 | .555 | .565 |
| F-248/3334-2-8    | 441231 | 3400-7200 | 248 | 258 | 310 | 320 | 108 | .022 | .022 | .533 | .555 |
| F-252/3574-2S1-10 | 440991 | 3800-7400 | 252 | 256 | 288 | 292 | 110 | .026 | .026 | .572 | .581 |
| F-252/3574-2S-6   | 440981 | 3800-7200 | 252 | 260 | 288 | 296 | 106 | .026 | .026 | .572 | .591 |
| F-256/3634-2S-6   | 441301 | 4000-7400 | 256 | 264 | 292 | 300 | 106 | .026 | .026 | .581 | .601 |
| F-260/3694-2S7-6  | 441431 | 4200-7600 | 260 | 264 | 296 | 300 | 106 | .026 | .026 | .591 | .601 |
| F-268/394-2S5-8   | 441551 | 4600-8000 | 268 | 272 | 304 | 308 | 108 | .018 | .018 | .630 | .640 |
| F-272/400-2S-6    | 441591 | 4800-8200 | 272 | 276 | 308 | 312 | 106 | .018 | .018 | .640 | .650 |
| F-276/406-2S1-8   | 441621 | 5000-8400 | 276 | 284 | 312 | 320 | 108 | .018 | .018 | .650 | .660 |

### Mechanical Roller Camshafts

|                   |        |           |     |     |     |     |     |      |      |      |      |
|-------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| SR-230/338-2S-10  | 448501 | 2400-6400 | 230 | 238 | 280 | 288 | 110 | .020 | .020 | .541 | .560 |
| TR-244/3867-2S-10 | 448031 | 3200-7000 | 244 | 252 | 284 | 292 | 110 | .022 | .022 | .619 | .640 |
| SR-246/362-2S-10  | 448601 | 3400-7200 | 246 | 254 | 296 | 304 | 110 | .020 | .020 | .579 | .598 |
| R-252/420-2S-8    | 448801 | 3600-7400 | 252 | 258 | 284 | 290 | 108 | .020 | .020 | .672 | .672 |
| R-254/420-2S2-8   | 448821 | 3800-7600 | 254 | 258 | 286 | 290 | 108 | .020 | .020 | .672 | .672 |
| SR-254/374-2S-10  | 448511 | 3800-7800 | 254 | 262 | 304 | 312 | 110 | .020 | .020 | .599 | .599 |
| R-258/420-2S-8    | 448831 | 4000-7600 | 258 | 262 | 290 | 294 | 108 | .020 | .020 | .672 | .672 |
| R-258/420-2S-10   | 448861 | 4000-7800 | 258 | 262 | 290 | 294 | 110 | .020 | .020 | .672 | .672 |
| R-260/452-2S-10   | 448301 | 4000-8000 | 260 | 268 | 289 | 300 | 110 | .020 | .020 | .723 | .672 |
| R-262/420-2S3-8   | 448841 | 4200-7800 | 262 | 268 | 294 | 300 | 108 | .020 | .020 | .672 | .672 |
| SR-262/374-2S-10  | 448671 | 4400-7800 | 262 | 274 | 312 | 323 | 110 | .020 | .024 | .598 | .584 |
| R-266/420-2S3-10  | 448871 | 4600-8000 | 266 | 276 | 298 | 308 | 110 | .020 | .020 | .672 | .672 |
| R-266/452-2S-10   | 448311 | 4600-8200 | 266 | 276 | 295 | 306 | 110 | .020 | .022 | .746 | .739 |
| R-268/420-2S1-8   | 448851 | 4800-8200 | 268 | 272 | 300 | 304 | 108 | .020 | .020 | .672 | .672 |
| R-272/4381-2S1-8  | 448891 | 5000-8400 | 272 | 278 | 304 | 310 | 108 | .020 | .022 | .701 | .701 |
| R-276/4334-2S-8   | 448291 | 5200-8400 | 276 | 284 | 316 | 284 | 108 | .026 | .026 | .693 | .683 |
| R-280/452-2S-10   | 448881 | 5400-8600 | 280 | 288 | 310 | 320 | 110 | .020 | .020 | .723 | .672 |
| R-284/466-2S-15   | 448321 | 5400-8800 | 284 | 296 | 316 | 336 | 115 | .020 | .030 | .746 | .753 |
| R-286/456-2S1-10  | 448331 | 5200-8800 | 286 | 290 | 326 | 330 | 110 | .026 | .026 | .730 | .734 |

## Ford-Mercury "Cleveland" V-8 70-82 - Boss 351-351C-351M-400 cu.in.

### Hydraulic Lifter Camshafts

|                  |        |           |     |     |     |     |     |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| H-192/2667-2S-14 | 520581 | 800-4200  | 192 | 204 | 248 | 260 | 114 | .000 | .000 | .461 | .493 |
| H-260-2          | 523901 | 1200-4800 | 204 | 214 | 260 | 276 | 112 | .000 | .000 | .493 | .502 |
| H-260-2          | 523902 | 1200-4800 | 204 | 214 | 260 | 276 | 112 | .000 | .000 | .493 | .502 |
| 266 H10          | 13303  | 1400-4800 | 210 | 210 | 266 | 266 | 110 | .000 | .000 | .508 | .508 |
| 266 H10          | 133032 | 1400-4800 | 210 | 210 | 266 | 266 | 110 | .000 | .000 | .508 | .508 |
| H-266-2          | 523921 | 1500-5000 | 210 | 218 | 266 | 280 | 112 | .000 | .000 | .508 | .510 |
| H-266-2          | 523922 | 1500-5000 | 210 | 218 | 266 | 280 | 112 | .000 | .000 | .508 | .510 |
| 272 H10          | 13304  | 1600-5200 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .524 | .524 |
| 272 H10          | 133042 | 1600-5200 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .524 | .524 |
| H-272-2          | 523941 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .524 | .519 |
| H-272-2          | 523942 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .524 | .519 |
| 278 H10          | 13313  | 2200-5600 | 222 | 222 | 278 | 278 | 110 | .000 | .000 | .539 | .539 |
| 278 H10          | 133132 | 2200-5600 | 222 | 222 | 278 | 278 | 110 | .000 | .000 | .539 | .539 |
| H-278-2          | 523801 | 2200-5800 | 222 | 234 | 278 | 290 | 114 | .000 | .000 | .539 | .534 |
| H-278-2          | 523802 | 2200-5800 | 222 | 234 | 278 | 290 | 114 | .000 | .000 | .539 | .534 |
| H-226/314-2S-6   | 520341 | 2400-6000 | 226 | 230 | 286 | 290 | 106 | .000 | .000 | .543 | .550 |
| H-288-2          | 524421 | 2400-6200 | 226 | 230 | 288 | 292 | 110 | .000 | .000 | .528 | .536 |
| H-288-2          | 524422 | 2400-6200 | 226 | 230 | 288 | 292 | 110 | .000 | .000 | .528 | .536 |
| 284 H12          | 13305  | 2600-6400 | 228 | 228 | 284 | 284 | 112 | .000 | .000 | .554 | .554 |
| 284 H12          | 133052 | 2600-6400 | 228 | 228 | 284 | 284 | 112 | .000 | .000 | .554 | .554 |
| H-292-2          | 524551 | 2800-6600 | 230 | 234 | 292 | 296 | 114 | .000 | .000 | .536 | .545 |
| H-238/3347-10    | 520641 | 3200-6800 | 238 | 238 | 294 | 294 | 110 | .000 | .000 | .579 | .579 |
| H-250/340-2S-10  | 520651 | 3600-7200 | 250 | 254 | 310 | 314 | 110 | .000 | .000 | .588 | .595 |

Section Continued 

| Grind Number                                 | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      |           | Valve Lash |      | Gross Valve Lift |      |
|--|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|  |             |                 | Int.            | Exh. | Int.                | Exh. | Lobe Sep. | Int.       | Exh. | Int.             | Exh. |
| <b>Hydraulic Roller Camshafts — Retrofit</b> |             |                 |                 |      |                     |      |           |            |      |                  |      |
| HR-216/325-25-12                             | 529541      | 1600-5600       | 216             | 224  | 278                 | 286  | 112       | .000       | .000 | .562             | .586 |
| HR-224/339-25-12                             | 529551      | 2000-6000       | 224             | 232  | 286                 | 294  | 112       | .000       | .000 | .586             | .609 |
| HR-228/345-25-12                             | 529801      | 2500-6500       | 228             | 232  | 290                 | 294  | 112       | .000       | .000 | .597             | .609 |
| HR-232/352-25-10                             | 529821      | 2600-6800       | 232             | 236  | 294                 | 298  | 110       | .000       | .000 | .609             | .621 |
| HR-236/359-25-12                             | 529811      | 3000-7000       | 236             | 240  | 298                 | 302  | 112       | .000       | .000 | .621             | .631 |
| HR-240/365-25-10                             | 529831      | 3200-7200       | 240             | 244  | 302                 | 306  | 110       | .000       | .000 | .631             | .644 |
| <b>Mechanical Lifter Camshafts</b>           |             |                 |                 |      |                     |      |           |            |      |                  |      |
| D1ZZ-6250-B                                  | 520321      | 2000-6000       | 228             | 228  | 294                 | 294  | 109       | .024       | .026 | .502             | .502 |
| F-232/330-25-8                               | 521131      | 2600-6600       | 232             | 238  | 264                 | 270  | 108       | .020       | .022 | .571             | .581 |
| F-238/3200-2-8                               | 521141      | 2800-6600       | 238             | 248  | 300                 | 310  | 108       | .022       | .022 | .554             | .577 |
| F-246/3294-2-8                               | 521211      | 3200-7000       | 246             | 256  | 282                 | 292  | 108       | .026       | .026 | .570             | .590 |
| F-256/3634-251-10                            | 521321      | 4000-7500       | 256             | 266  | 292                 | 302  | 110       | .026       | .026 | .629             | .610 |
| F-260/3694-6                                 | 521421      | 4200-7600       | 260             | 260  | 296                 | 296  | 106       | .026       | .026 | .639             | .639 |
| F-266/400-25-8                               | 521501      | 4600-8000       | 266             | 276  | 298                 | 312  | 108       | .018       | .018 | .692             | .702 |
| F-276/3934-8                                 | 521631      | 4800-8200       | 276             | 276  | 312                 | 312  | 108       | .026       | .026 | .681             | .681 |
| <b>Mechanical Roller Camshafts</b>           |             |                 |                 |      |                     |      |           |            |      |                  |      |
| SR-238/350-25-12                             | 528511      | 2800-6800       | 238             | 246  | 288                 | 296  | 112       | .020       | .020 | .606             | .626 |
| R-246/3236-2-8                               | 528371      | 3200-7200       | 246             | 256  | 284                 | 294  | 108       | .024       | .026 | .560             | .585 |
| SR-246/362-25-12                             | 528521      | 3200-7200       | 246             | 254  | 296                 | 304  | 112       | .020       | .020 | .626             | .647 |
| R-252/420-2-8                                | 528801      | 3600-7600       | 252             | 262  | 284                 | 294  | 108       | .020       | .020 | .727             | .727 |
| R-262/420-2-8                                | 528811      | 4000-8000       | 262             | 272  | 294                 | 304  | 108       | .020       | .020 | .727             | .727 |
| R-262/4381-25-8                              | 528411      | 4200-8200       | 262             | 268  | 294                 | 300  | 108       | .020       | .022 | .758             | .758 |
| R-272/420-2-8                                | 528821      | 4400-8200       | 272             | 282  | 304                 | 314  | 108       | .020       | .020 | .727             | .727 |
| R-278/5002-25-12                             | 528831      | 4600-8400       | 278             | 292  | 306                 | 320  | 112       | .020       | .022 | .865             | .865 |
| R-282/5001-25-10                             | 528841      | 5000-8800       | 282             | 286  | 314                 | 318  | 110       | .020       | .016 | .865             | .832 |

### Ford-Mercury V-8 91-10 - 4.6-5.4 Litre SOHC 2 Valve

| <b>Hydraulic Roller Follower Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |
|--|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-218/500-2-16                            | 379501 | 2000-5000 | 218 | 228 | 254 | 264 | 116 | .000 | .000 | .500 | .500 |
| HR-228/500-25-12                           | 379511 | 2400-6200 | 228 | 234 | 264 | 270 | 112 | .000 | .000 | .500 | .500 |
| HR-212/550-25-15                           | 379601 | 1600-5500 | 212 | 218 | 248 | 254 | 115 | .000 | .000 | .550 | .550 |
| HR-218/550-2-16                            | 379611 | 2000-5800 | 218 | 228 | 254 | 264 | 116 | .000 | .000 | .550 | .550 |
| HR-228/550-25-12                           | 379621 | 2400-6200 | 228 | 234 | 264 | 270 | 112 | .000 | .000 | .550 | .550 |
| HR-236/600-25-14                           | 379631 | 2800-6600 | 236 | 242 | 272 | 278 | 114 | .000 | .000 | .600 | .600 |

### Ford-Mercury V-8 93-10 - 4.6-5.4 Litre DOHC 4 Valve

| <b>Hydraulic Roller Follower Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |
|--|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-218/500-12                              | 409501 | 2000-5800 | 218 | 218 | 254 | 254 | 112 | .000 | .000 | .500 | .500 |
| HR-218/500-12                              | 409502 | 2000-5800 | 218 | 218 | 254 | 254 | 112 | .000 | .000 | .500 | .500 |
| HR-218/500-12                              | 409503 | 2000-5800 | 218 | 218 | 254 | 254 | 112 | .000 | .000 | .500 | .500 |
| HR-218/500-12                              | 409504 | 2000-5800 | 218 | 218 | 254 | 254 | 112 | .000 | .000 | .500 | .500 |
| HR-228/500-12                              | 409511 | 2400-6200 | 228 | 228 | 264 | 264 | 112 | .000 | .000 | .500 | .500 |
| HR-228/500-12                              | 409512 | 2400-6200 | 228 | 228 | 264 | 264 | 112 | .000 | .000 | .500 | .500 |
| HR-228/500-12                              | 409513 | 2400-6200 | 228 | 228 | 264 | 264 | 112 | .000 | .000 | .500 | .500 |
| HR-228/500-12                              | 409514 | 2400-6200 | 228 | 228 | 264 | 264 | 112 | .000 | .000 | .500 | .500 |
| HR-234/500-12                              | 409521 | 2800-6600 | 234 | 234 | 270 | 270 | 112 | .000 | .000 | .500 | .500 |
| HR-234/500-12                              | 409522 | 2800-6600 | 234 | 234 | 270 | 270 | 112 | .000 | .000 | .500 | .500 |
| HR-234/500-12                              | 409523 | 2800-6600 | 234 | 234 | 270 | 270 | 112 | .000 | .000 | .500 | .500 |
| HR-234/500-12                              | 409524 | 2800-6600 | 234 | 234 | 270 | 270 | 112 | .000 | .000 | .500 | .500 |
| HR-230/575-12                              | 409601 | 2400-6200 | 230 |     | 266 |     | 112 | .000 |      | .575 |      |
| HR-230/575-12                              | 409602 | 2400-6200 | 230 |     | 266 |     | 112 | .000 |      | .575 |      |
| HR-234/575-12                              | 409611 | 2800-6600 | 234 |     | 270 |     | 112 | .000 |      | .575 |      |
| HR-234/575-12                              | 409612 | 2800-6600 | 234 |     | 270 |     | 112 | .000 |      | .575 |      |
| HR-238/575-12                              | 409621 | 3200-6800 | 238 |     | 274 |     | 112 | .000 |      | .575 |      |
| HR-238/575-12                              | 409622 | 3200-6800 | 238 |     | 274 |     | 112 | .000 |      | .575 |      |

# Camshaft Quick Reference Guide

QUICK REFERENCE

| Grind Number   | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |  |
|--|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|--|
|  |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |  |
| <b>Ford-Mercury V-8 05-10 - 4.6-5.4 Litre SOHC 3 Valve</b> |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| <b>Hydraulic Roller Follower Camshafts</b>                 |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| ZHR-208/468-2S-14  | 399501      | 1800-5000       | 208             | 224  | 256                 | 272  | 114       | .000       | .000 | .468             | .516 |  |
| ZHR-216/492-2S-14  | 399511      | 2200-5400       | 216             | 236  | 264                 | 284  | 114       | .000       | .000 | .492             | .552 |  |
| ZHR-228/528-2S-12  | 399521      | 2600-6200       | 228             | 244  | 276                 | 292  | 112       | .000       | .000 | .528             | .576 |  |
| ZHR-236/552-2S-12  | 399531      | 2800-6600       | 236             | 252  | 284                 | 300  | 112       | .000       | .000 | .552             | .600 |  |

## Ford-Mercury V-8 63-76 - 352-360-390-406-410-427-428 cu.in.

| <b>Hydraulic Lifter Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |  |
|-----------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|--|
| H-248-2                           | 343971 | 800-4200  | 192 | 204 | 248 | 260 | 114 | .000 | .000 | .469 | .501 |  |
| H-260-2                           | 343901 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .501 | .533 |  |
| H-260-2                           | 343902 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .501 | .533 |  |
| 266 H10                           | 13404  | 1400-4800 | 210 | 210 | 266 | 266 | 110 | .000 | .000 | .516 | .516 |  |
| 266 H10                           | 134042 | 1400-4800 | 210 | 210 | 266 | 266 | 110 | .000 | .000 | .516 | .516 |  |
| 272 H10                           | 13405  | 1800-5200 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .533 | .533 |  |
| 272 H10                           | 134052 | 1800-5200 | 216 | 216 | 272 | 272 | 110 | .000 | .000 | .533 | .533 |  |
| H-272-2                           | 343941 | 1800-5200 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .533 | .563 |  |
| H-272-2                           | 343942 | 1800-5200 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .533 | .563 |  |
| C8AX-6250-C                       | 340301 | 1800-5200 | 220 | 230 | 278 | 290 | 116 | .000 | .000 | .498 | .498 |  |
| H-278-2                           | 343801 | 2000-5400 | 222 | 234 | 278 | 290 | 114 | .000 | .000 | .548 | .580 |  |
| H-278-2                           | 343802 | 2000-5400 | 222 | 234 | 278 | 290 | 114 | .000 | .000 | .548 | .580 |  |
| H-288                             | 344341 | 2200-5600 | 226 | 226 | 288 | 288 | 112 | .000 | .000 | .537 | .537 |  |
| H-288                             | 344342 | 2200-5600 | 226 | 226 | 288 | 288 | 112 | .000 | .000 | .537 | .537 |  |
| H-296-2                           | 344621 | 2800-6200 | 234 | 238 | 296 | 300 | 112 | .000 | .000 | .554 | .563 |  |
| H-298                             | 344561 | 3000-6500 | 236 | 236 | 298 | 298 | 108 | .000 | .000 | .572 | .572 |  |
| H-246/330-10                      | 340721 | 3400-6800 | 246 | 246 | 308 | 308 | 110 | .000 | .000 | .581 | .581 |  |

| <b>Hydraulic Roller Camshafts — Retrofit</b> |        |           |     |     |     |     |     |      |      |      |      |  |
|--|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|--|
| HR-214/319-2S-12                             | 349511 | 1400-5400 | 214 | 222 | 276 | 284 | 112 | .000 | .000 | .561 | .584 |  |
| HR-222/320-2S-12                             | 349551 | 1800-5600 | 222 | 226 | 286 | 290 | 112 | .000 | .000 | .563 | .563 |  |
| HR-226/3201-2S-12                            | 349561 | 2000-5800 | 226 | 236 | 290 | 302 | 112 | .000 | .000 | .563 | .581 |  |
| HR-234/354-2S-12                             | 349571 | 2400-6200 | 234 | 242 | 298 | 306 | 112 | .000 | .000 | .623 | .651 |  |
| HR-242/350-2S-12                             | 349581 | 2800-6400 | 242 | 248 | 308 | 312 | 112 | .000 | .000 | .616 | .616 |  |

| <b>Mechanical Lifter Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |  |
|------------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|--|
| F-238/3200-2-14                    | 341191 | 2400-6000 | 238 | 248 | 300 | 310 | 114 | .026 | .026 | .563 | .584 |  |
| C3AZ-6250-AA                       | 340321 | 3000-6600 | 244 | 244 | 284 | 284 | 114 | .018 | .022 | .524 | .524 |  |
| F-248/3334-12                      | 340471 | 3400-7000 | 248 | 248 | 310 | 312 | 112 | .026 | .026 | .587 | .587 |  |
| F-254/382-2S-10                    | 341341 | 3800-7200 | 254 | 262 | 286 | 298 | 110 | .018 | .018 | .672 | .678 |  |
| F-266/3528-8                       | 341461 | 4200-7600 | 266 | 266 | 302 | 302 | 108 | .026 | .026 | .621 | .621 |  |

| <b>Mechanical Roller Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |  |
|------------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|--|
| SR-240/350-2S-14                   | 348511 | 2800-6600 | 240 | 248 | 290 | 298 | 114 | .020 | .020 | .616 | .637 |  |
| SR-248/362-2S-10                   | 348521 | 3000-6800 | 248 | 256 | 285 | 292 | 110 | .020 | .020 | .637 | .658 |  |
| R-252/420-2-8                      | 348801 | 3400-7200 | 252 | 262 | 284 | 294 | 108 | .020 | .020 | .739 | .739 |  |
| R-260/420-2-10                     | 348821 | 3800-7600 | 260 | 270 | 292 | 302 | 110 | .020 | .020 | .739 | .739 |  |
| R-266/420-2-10                     | 348831 | 4200-7800 | 266 | 276 | 298 | 308 | 110 | .020 | .020 | .739 | .739 |  |
| R-276/420-2-10                     | 348841 | 4600-8200 | 276 | 286 | 308 | 318 | 110 | .020 | .020 | .739 | .739 |  |
| R-276/4334-2S2-10                  | 348291 | 4800-8400 | 276 | 282 | 316 | 322 | 110 | .026 | .026 | .763 | .727 |  |
| R-282/427-2S1-8                    | 348301 | 5000-8400 | 282 | 286 | 320 | 320 | 108 | .028 | .026 | .752 | .752 |  |

## Ford-Mercury V-8 68-97 - 370-429-460 (7.5L) cu.in.

| <b>Hydraulic Lifter Camshafts</b> |        |           |     |     |     |     |     |      |      |      |      |  |
|-----------------------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|--|
| H-192/2667-2S-10                  | 350501 | 800-4200  | 192 | 204 | 248 | 260 | 110 | .000 | .000 | .456 | .487 |  |
| H-260-2                           | 353901 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .487 | .518 |  |
| H-260-2                           | 353902 | 1200-4800 | 204 | 216 | 260 | 272 | 112 | .000 | .000 | .487 | .518 |  |
| H-266-2                           | 353931 | 1400-5000 | 210 | 218 | 266 | 274 | 114 | .000 | .000 | .487 | .504 |  |
| H-266-2                           | 353932 | 1400-5000 | 210 | 218 | 266 | 274 | 114 | .000 | .000 | .487 | .504 |  |
| H-272-2                           | 353941 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .518 | .513 |  |
| H-272-2                           | 353942 | 1800-5400 | 216 | 228 | 272 | 284 | 112 | .000 | .000 | .518 | .513 |  |
| H-226/314-2-8                     | 350541 | 2200-5800 | 226 | 236 | 286 | 296 | 108 | .000 | .000 | .537 | .556 |  |
| H-288-2                           | 354551 | 2400-6000 | 226 | 230 | 288 | 292 | 112 | .000 | .000 | .522 | .530 |  |
| H-288-2                           | 354552 | 2400-6000 | 226 | 230 | 288 | 292 | 112 | .000 | .000 | .522 | .530 |  |
| H-230/318-2-14                    | 350551 | 2600-6200 | 230 | 240 | 290 | 300 | 114 | .000 | .000 | .544 | .563 |  |
| H-296-2                           | 354561 | 3000-6600 | 236 | 240 | 296 | 300 | 110 | .000 | .000 | .556 | .563 |  |
| H-296-2                           | 354562 | 3000-6600 | 236 | 240 | 296 | 300 | 110 | .000 | .000 | .556 | .563 |  |
| H-242/378-2S-12                   | 350561 | 3200-6800 | 242 | 250 | 306 | 312 | 112 | .000 | .000 | .646 | .636 |  |
| H-248/3500-8                      | 350681 | 3400-7000 | 248 | 248 | 304 | 304 | 108 | .000 | .000 | .599 | .599 |  |
| H-252/400-2S-12                   | 350571 | 3800-7200 | 252 | 256 | 322 | 326 | 112 | .000 | .000 | .684 | .684 |  |

Section Continued

**CRANECAMS.COM**

| Grind Number                                 | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |  |
|--|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|--|
|  |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |  |
| <b>Hydraulic Roller Camshafts — Retrofit</b> |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| HR-200/311-2S-12                             | 359331      | 800-4600        | 200             | 212  | 262                 | 274  | 112       | .000       | .000 | .532             | .568 |  |
| HR-212/332-2S-14                             | 359371      | 1200-5000       | 212             | 216  | 274                 | 278  | 114       | .000       | .000 | .568             | .556 |  |
| HR-216/325-2S-12                             | 359341      | 1400-5400       | 216             | 224  | 278                 | 286  | 112       | .000       | .000 | .556             | .580 |  |
| HR-228/345-2S-14                             | 359351      | 2200-6200       | 228             | 238  | 290                 | 300  | 114       | .000       | .000 | .590             | .614 |  |
| HR-234/340-2S-10                             | 359381      | 2400-6400       | 234             | 242  | 300                 | 308  | 110       | .000       | .000 | .581             | .581 |  |
| HR-238/359-2S-12                             | 359361      | 3000-6600       | 238             | 246  | 300                 | 308  | 112       | .000       | .000 | .614             | .636 |  |
| HR-246/372-2S-12                             | 359391      | 3200-6800       | 246             | 250  | 308                 | 312  | 112       | .000       | .000 | .636             | .636 |  |
| HR-258/372-2S-14                             | 359401      | 3600-6800       | 258             | 266  | 320                 | 328  | 114       | .000       | .000 | .636             | .636 |  |
| HR-264/400-2S-14                             | 359411      | 4000-6800       | 264             | 268  | 334                 | 338  | 114       | .000       | .000 | .684             | .684 |  |
| <b>Mechanical Lifter Camshafts</b>           |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| F-238/3200-2-12                              | 351201      | 3000-6600       | 238             | 248  | 300                 | 310  | 112       | .022       | .022 | .547             | .570 |  |
| F-246/3294-2-8                               | 351211      | 3600-7000       | 246             | 256  | 282                 | 292  | 108       | .026       | .026 | .563             | .583 |  |
| F-246/3294-2-8                               | 351212      | 3600-7000       | 246             | 256  | 282                 | 292  | 108       | .026       | .026 | .563             | .583 |  |
| F-256/3412-2-8                               | 351341      | 4000-7400       | 256             | 266  | 292                 | 302  | 108       | .026       | .026 | .583             | .603 |  |
| F-256/3412-2-12                              | 351351      | 4200-7600       | 256             | 266  | 292                 | 302  | 112       | .026       | .026 | .583             | .603 |  |
| F-266/3528-2-8                               | 351511      | 4400-7800       | 266             | 276  | 302                 | 312  | 108       | .026       | .026 | .603             | .624 |  |
| F-272/3874-2S-8                              | 351601      | 4600-8000       | 272             | 280  | 308                 | 316  | 108       | .026       | .026 | .662             | .683 |  |
| F-272/3874-2S-12                             | 351611      | 4800-8200       | 272             | 280  | 308                 | 316  | 112       | .026       | .026 | .662             | .683 |  |
| F-274/3934-2S-10                             | 351621      | 4600-8200       | 274             | 278  | 304                 | 308  | 110       | .012       | .012 | .673             | .684 |  |
| F-286/3765-2S-12                             | 351631      | 5000-8400       | 286             | 292  | 322                 | 332  | 112       | .026       | .030 | .644             | .653 |  |
| <b>Mechanical Roller Camshafts</b>           |             |                 |                 |      |                     |      |           |            |      |                  |      |  |
| SR-232/338-2S-12                             | 358501      | 2500-6500       | 232             | 240  | 282                 | 290  | 112       | .020       | .020 | .578             | .599 |  |
| SR-248/362-2S1-12                            | 358511      | 3000-6800       | 248             | 256  | 298                 | 306  | 112       | .020       | .020 | .619             | .640 |  |
| R-252/420-2-10                               | 358801      | 3400-7200       | 252             | 262  | 284                 | 294  | 110       | .020       | .020 | .718             | .718 |  |
| SR-252/400-2S-10                             | 358521      | 3200-7000       | 252             | 260  | 290                 | 298  | 110       | .020       | .022 | .684             | .684 |  |
| R-258/420-2S-8                               | 358201      | 3600-7400       | 258             | 268  | 290                 | 300  | 108       | .020       | .020 | .718             | .718 |  |
| R-266/434-2S-12                              | 358211      | 3800-7800       | 266             | 278  | 300                 | 310  | 112       | .020       | .020 | .742             | .718 |  |
| R-268/420-2-10                               | 358821      | 4000-7800       | 268             | 278  | 300                 | 310  | 110       | .020       | .020 | .718             | .718 |  |
| R-272/420-2S1-10                             | 358831      | 4200-8000       | 272             | 280  | 304                 | 312  | 110       | .020       | .020 | .718             | .718 |  |
| R-272/436-2S-14                              | 358221      | 4200-8200       | 272             | 280  | 302                 | 312  | 114       | .020       | .022 | .746             | .732 |  |
| R-276/420-2-10                               | 358841      | 4400-8200       | 276             | 286  | 308                 | 318  | 110       | .020       | .020 | .718             | .718 |  |
| R-276/4334-2S-12 SF01                        | 358231      | 4600-8400       | 276             | 286  | 316                 | 326  | 112       | .026       | .026 | .741             | .730 |  |
| R-280/5152-2S-14 SF01                        | 358241      | 5000-8800       | 280             | 296  | 310                 | 336  | 114       | .020       | .030 | .881             | .805 |  |
| R-288/5152-2S-16 SF01                        | 358251      | 5400-9200       | 288             | 310  | 318                 | 346  | 116       | .020       | .030 | .881             | .838 |  |

### Honda VTEC 4 cyl. 92-00 Civic EX - SOHC 4-V 1.6 Litre D16Y8

|  |          |           |           |     |     |     |     |      |      |      |      |  |
|--|----------|-----------|-----------|-----|-----|-----|-----|------|------|------|------|--|
| <b>Hydraulic Roller Follower Camshafts</b> |          |           |           |     |     |     |     |      |      |      |      |  |
| HON-224/423-VTEC-11                        | 252-0010 | 2500-8500 | VTEC: 224 | 210 | 258 | 238 | 110 | .008 | .010 | .423 | .386 |  |
| HON-224/423-VTEC-11                        | 252-0010 | 2500-8500 | PRI: 186  | 186 | 214 | 214 | 111 | .008 | .010 | .319 | .319 |  |
| HON-224/423-VTEC-11                        | 252-0010 | 2500-8500 | SEC: 190  | 190 | 218 | 218 | 110 | .008 | .010 | .327 | .327 |  |
| HON-232/443-VTEC-13                        | 252-0012 | 3000-9000 | VTEC: 232 | 218 | 266 | 246 | 112 | .008 | .010 | .443 | .386 |  |
| HON-232/443-VTEC-13                        | 252-0012 | 3000-9000 | PRI: 186  | 186 | 214 | 214 | 113 | .008 | .010 | .319 | .319 |  |
| HON-232/443-VTEC-13                        | 252-0012 | 3000-9000 | SEC: 190  | 190 | 218 | 218 | 110 | .008 | .010 | .327 | .327 |  |

# Camshaft Quick Reference Guide

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

## MG TC-TD-TF 4 cyl. 40-54 - 1250cc

### Mechanical Lifter Camshafts

|                |          |           |     |     |     |     |     |      |      |      |      |
|----------------|----------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| 553-05         | 340-0002 | 1000-4500 | 190 | 190 | 242 | 242 | 110 | .018 | .020 | .357 | .357 |
| F-222/280-2-10 | 340-0010 | 1800-5200 | 222 | 232 | 260 | 270 | 110 | .016 | .018 | .420 | .441 |
| MG-T-3         | 340-0012 | 2400-5800 | 234 | 234 | 294 | 294 | 110 | .028 | .030 | .443 | .443 |

## MGA-MGB 4 cyl. 57-80 - 1598-1798cc

### Mechanical Lifter Camshafts

|                |          |           |     |     |     |     |       |      |      |      |      |
|----------------|----------|-----------|-----|-----|-----|-----|-------|------|------|------|------|
| 88G303         | 342-0002 | 1000-4500 | 199 | 215 | 248 | 263 | 107.5 | .012 | .014 | .376 | .376 |
| F-222/280-2-10 | 342-0010 | 1800-5200 | 222 | 232 | 260 | 270 | 110   | .014 | .016 | .399 | .419 |
| F-232/294-8    | 342-0012 | 2400-5800 | 232 | 232 | 270 | 270 | 108   | .016 | .018 | .419 | .419 |
| F-260/338-6    | 342-0107 | 4000-7500 | 260 | 260 | 312 | 312 | 106   | .028 | .030 | .482 | .482 |

## MG Midget-Mini-Sprite 4 cyl. 57-84 BMCA 848-12758cc

### Mechanical Lifter Camshafts

|                  |          |           |     |     |     |     |     |      |      |      |      |
|------------------|----------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| F-222/280-2-10   | 344-0010 | 1800-5200 | 222 | 232 | 260 | 270 | 110 | .012 | .014 | .353 | .370 |
| F-232/294-2-10   | 344-0012 | 2200-5600 | 232 | 242 | 270 | 280 | 110 | .012 | .014 | .370 | .388 |
| F-236/3526-25-02 | 344-0102 | 4500-8000 | 256 | 266 | 290 | 300 | 102 | .020 | .020 | .444 | .449 |

## Mitsubishi 4G63/4G63-T 4 cyl. Eclipse - Talon - Gallant 1989-1999 - DOHC 4-V 2.0 Litre

### Hydraulic Roller Follower Camshafts

|                |          |           |     |     |     |     |     |      |      |      |      |
|----------------|----------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| MIT-248-2SR-10 | 435-0010 | 800-6500  | 208 | 200 | 248 | 240 | 110 | .000 | .000 | .404 | .384 |
| MIT-256-2SR-10 | 435-0012 | 1200-6800 | 216 | 208 | 256 | 248 | 110 | .000 | .000 | .424 | .404 |
| MIT-264-2SR-10 | 435-0014 | 1500-7500 | 224 | 216 | 264 | 256 | 110 | .000 | .000 | .443 | .424 |

## Mitsubishi 420A 4 cyl. Eclipse non-Turbo 1995-1999 - DOHC 4-V 2.0 Litre

### Hydraulic Roller Follower Camshafts

|               |          |           |     |     |     |     |     |      |      |      |      |
|---------------|----------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| MIT-242-8     | 431-0010 | 800-6500  | 200 | 200 | 242 | 242 | 108 | .000 | .000 | .354 | .354 |
| MIT-246-10    | 431-0012 | 1200-6800 | 204 | 204 | 246 | 246 | 110 | .000 | .000 | .364 | .364 |
| MIT-246-2SR-8 | 431-0014 | 1500-6800 | 204 | 196 | 246 | 238 | 108 | .000 | .000 | .364 | .344 |
| MIT-250-8     | 431-0016 | 2000-7200 | 208 | 208 | 250 | 250 | 108 | .000 | .000 | .374 | .374 |
| MIT-258-10    | 431-0018 | 2500-7500 | 216 | 216 | 258 | 258 | 110 | .000 | .000 | .394 | .394 |

## Mitsubishi 4G63BT EVO 8 4 cyl. 2003-2005 - DOHC 4-V 2.0 Litre

### Hydraulic Roller Follower Camshafts

|                |          |           |     |     |     |     |     |      |      |      |      |
|----------------|----------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| MIT-248-2SR-10 | 440-0010 | 800-6500  | 208 | 200 | 248 | 240 | 110 | .000 | .000 | .404 | .384 |
| MIT-256-2SR-10 | 440-0012 | 1200-6800 | 216 | 208 | 256 | 248 | 110 | .000 | .000 | .424 | .404 |
| MIT-264-2SR-10 | 440-0014 | 1500-7500 | 224 | 216 | 264 | 256 | 110 | .000 | .000 | .443 | .424 |

## Oldsmobile V-8 67-84 - 260-307 (5.0L)-350 (5.7L)-400-403-425-455 cu.in. - 39° bank angle engines

### Hydraulic Lifter Camshafts

|                  |        |           |     |     |     |     |       |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-------|------|------|------|------|
| H-192/2667-25-10 | 800501 | 800-4200  | 192 | 204 | 248 | 260 | 110   | .000 | .000 | .427 | .456 |
| H-260-2          | 803901 | 1200-4800 | 204 | 216 | 260 | 272 | 112   | .000 | .000 | .456 | .484 |
| H-260-2          | 803902 | 1200-4800 | 204 | 216 | 260 | 272 | 112   | .000 | .000 | .456 | .484 |
| H-272-2          | 804541 | 1600-5400 | 216 | 228 | 272 | 284 | 112   | .000 | .000 | .484 | .512 |
| H-272-2          | 804542 | 1600-5400 | 216 | 228 | 272 | 284 | 112   | .000 | .000 | .484 | .512 |
| H-284-2          | 804551 | 2200-5800 | 222 | 230 | 284 | 292 | 110   | .000 | .000 | .480 | .496 |
| H-284-2          | 804552 | 2200-5800 | 222 | 230 | 284 | 292 | 110   | .000 | .000 | .480 | .496 |
| H-292-2          | 804461 | 2800-6400 | 230 | 234 | 292 | 296 | 110   | .000 | .000 | .496 | .504 |
| 402194           | 800101 | 2600-6000 | 232 | 232 | 300 | 300 | 113.5 | .000 | .000 | .474 | .474 |
| H-234/325-2-10   | 800601 | 2800-6400 | 234 | 244 | 304 | 314 | 110   | .000 | .000 | .520 | .542 |
| H-238/3347-2-10  | 800661 | 3000-6600 | 238 | 248 | 294 | 304 | 110   | .000 | .000 | .536 | .560 |
| H-244/3439-25-10 | 800741 | 3200-6800 | 244 | 256 | 300 | 312 | 110   | .000 | .000 | .550 | .560 |
| H-248/3500-25-12 | 800681 | 3400-6800 | 248 | 256 | 304 | 312 | 112   | .000 | .000 | .560 | .560 |

### Hydraulic Roller Camshafts — Retrofit

|                     |        |           |     |     |     |     |     |      |      |      |      |
|---------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-214/325-25-12 IG | 809611 | 1400-5600 | 214 | 222 | 276 | 284 | 112 | .000 | .000 | .520 | .542 |
| HR-222/339-25-12 IG | 809621 | 1800-6000 | 222 | 230 | 284 | 292 | 112 | .000 | .000 | .542 | .563 |
| HR-230/352-25-14 IG | 809631 | 2200-6400 | 230 | 242 | 292 | 304 | 114 | .000 | .000 | .563 | .595 |
| HR-242/372-25-14 IG | 809641 | 3000-6800 | 242 | 254 | 304 | 316 | 114 | .000 | .000 | .595 | .595 |

### Mechanical Lifter Camshafts

|                 |        |           |     |     |     |     |     |      |      |      |      |
|-----------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| F-238/3200-2-10 | 801181 | 2800-6600 | 238 | 248 | 300 | 310 | 110 | .022 | .022 | .512 | .533 |
| F-248/3334-2-8  | 801231 | 3600-7400 | 248 | 258 | 310 | 320 | 108 | .022 | .022 | .533 | .555 |

### Mechanical Roller Camshafts

|                 |        |           |     |     |     |     |     |      |      |      |      |
|-----------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| R-252/420-2-8   | 808801 | 3200-7400 | 252 | 262 | 289 | 294 | 108 | .020 | .020 | .672 | .672 |
| R-262/420-2-10  | 808811 | 3600-7600 | 262 | 272 | 294 | 304 | 110 | .020 | .020 | .672 | .672 |
| R-272/420-2-10  | 808821 | 4200-8200 | 272 | 282 | 304 | 314 | 110 | .020 | .020 | .672 | .672 |
| R-282/450-252-8 | 808351 | 5000-8800 | 282 | 292 | 322 | 332 | 108 | .026 | .026 | .720 | .681 |

| Grind Number | Part Number | RPM Power Range | Duration@ .050" |      | Advertised Duration |      | Lobe Sep. | Valve Lash |      | Gross Valve Lift |      |
|--------------|-------------|-----------------|-----------------|------|---------------------|------|-----------|------------|------|------------------|------|
|              |             |                 | Int.            | Exh. | Int.                | Exh. |           | Int.       | Exh. | Int.             | Exh. |

**Pontiac V-8 55-81 - 265 (4.3L)-287-301 (4.9L)-316-326-347-350-370-389-400 (6.6L)-421-428-455 cu.in.**

**Hydraulic Lifter Camshafts**

|                  |        |           |     |     |     |     |       |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-------|------|------|------|------|
| H-192/2667-2S-12 | 280511 | 800-4200  | 192 | 204 | 248 | 260 | 112   | .000 | .000 | .400 | .427 |
| H-260-2          | 283901 | 1200-4800 | 204 | 216 | 260 | 272 | 112   | .000 | .000 | .427 | .454 |
| H-260-2          | 283902 | 1200-4800 | 204 | 216 | 260 | 272 | 112   | .000 | .000 | .427 | .454 |
| 9779068          | 968781 | 1600-5000 | 212 | 225 |     |     | 115.5 | .000 | .000 | .408 | .407 |
| 272 H10          | 10507  | 1800-5200 | 216 | 216 | 272 | 272 | 110   | .000 | .000 | .454 | .454 |
| 272 H10          | 105072 | 1800-5200 | 216 | 216 | 272 | 272 | 110   | .000 | .000 | .454 | .454 |
| H-272-2          | 283941 | 1800-5400 | 216 | 228 | 272 | 284 | 112   | .000 | .000 | .454 | .480 |
| H-272-2          | 283942 | 1800-5400 | 216 | 228 | 272 | 284 | 112   | .000 | .000 | .454 | .480 |
| Z-268-2          | 283511 | 1800-5600 | 218 | 224 | 268 | 274 | 112   | .000 | .000 | .459 | .473 |
| Z-268-2          | 283512 | 1800-5600 | 218 | 224 | 268 | 274 | 112   | .000 | .000 | .459 | .473 |
| H-278-2          | 283801 | 2000-5600 | 222 | 234 | 278 | 290 | 114   | .000 | .000 | .467 | .494 |
| H-278-2          | 283802 | 2000-5600 | 222 | 234 | 278 | 290 | 114   | .000 | .000 | .467 | .494 |
| H-288-2          | 283951 | 2400-6000 | 226 | 234 | 288 | 296 | 114   | .000 | .000 | .458 | .473 |
| H-288-2          | 283952 | 2400-6000 | 226 | 234 | 288 | 296 | 114   | .000 | .000 | .458 | .473 |
| 284 H12          | 10508  | 2800-6200 | 228 | 228 | 284 | 284 | 112   | .000 | .000 | .480 | .480 |
| 284 H12          | 105082 | 2800-6200 | 228 | 228 | 284 | 284 | 112   | .000 | .000 | .480 | .480 |
| 9794041          | 969681 | 2600-6000 | 230 | 240 |     |     | 113.5 | .000 | .000 | .469 | .496 |
| Z-280-2          | 283521 | 2600-6400 | 230 | 240 | 280 | 290 | 112   | .000 | .000 | .486 | .494 |
| Z-280-2          | 283522 | 2600-6400 | 230 | 240 | 280 | 290 | 112   | .000 | .000 | .486 | .494 |
| H-234/325-10     | 280441 | 3000-6400 | 234 | 234 | 304 | 304 | 110   | .000 | .000 | .488 | .488 |
| H-296-2          | 284281 | 2800-6600 | 234 | 242 | 296 | 304 | 112   | .000 | .000 | .473 | .488 |
| H-244/3387-2-8   | 280451 | 3400-6800 | 244 | 254 | 314 | 324 | 108   | .000 | .000 | .508 | .532 |
| H-308-2          | 284571 | 3400-7000 | 246 | 254 | 308 | 316 | 114   | .000 | .000 | .495 | .510 |
| H-260/360-2S-8   | 280601 | 3800-7200 | 260 | 268 | 330 | 338 | 108   | .000 | .000 | .540 | .558 |

**Hydraulic Roller Camshafts — Retrofit**

|                     |        |           |     |     |     |     |     |      |      |      |      |
|---------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| HR-214/325-2S-12 IG | 289611 | 1400-5600 | 214 | 222 | 276 | 284 | 112 | .000 | .000 | .488 | .509 |
| HR-222/339-2S-12 IG | 289621 | 1800-6000 | 222 | 230 | 284 | 292 | 112 | .000 | .000 | .509 | .528 |
| HR-226/345-2S-12 IG | 289661 | 2000-6200 | 226 | 234 | 288 | 296 | 112 | .000 | .000 | .518 | .539 |
| HR-230/352-2S-14 IG | 289631 | 2200-6400 | 230 | 238 | 292 | 300 | 114 | .000 | .000 | .528 | .548 |
| HR-238/365-2S-14 IG | 289651 | 2600-6600 | 238 | 246 | 300 | 308 | 114 | .000 | .000 | .548 | .558 |
| HR-242/372-2-14 IG  | 289641 | 3000-6800 | 242 | 252 | 304 | 314 | 114 | .000 | .000 | .558 | .558 |

**Mechanical Lifter Camshafts**

|                  |        |           |     |     |     |     |       |      |      |      |      |
|------------------|--------|-----------|-----|-----|-----|-----|-------|------|------|------|------|
| 541596           | 280901 | 2600-6400 | 236 | 247 | 268 | 284 | 113.5 | .012 | .018 | .416 | .420 |
| F-244/3454-2S-6  | 280921 | 3000-7000 | 244 | 252 | 280 | 288 | 106   | .026 | .026 | .518 | .536 |
| F-248/3334-2-12  | 281241 | 3400-7000 | 248 | 258 | 290 | 300 | 112   | .022 | .022 | .500 | .520 |
| F-252/3574-2S1-6 | 280981 | 3600-7400 | 252 | 260 | 288 | 296 | 106   | .026 | .026 | .536 | .554 |
| F-260/3694-2S-8  | 281441 | 4000-7600 | 260 | 268 | 296 | 304 | 108   | .026 | .026 | .554 | .572 |

**Mechanical Roller Camshafts**

|                     |        |           |     |     |     |     |     |      |      |      |      |
|---------------------|--------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| SR-228/338-2S-12 IG | 288541 | 2200-6200 | 228 | 236 | 278 | 286 | 112 | .020 | .020 | .507 | .525 |
| SR-236/350-2S-12 IG | 288551 | 2600-6600 | 236 | 244 | 286 | 294 | 112 | .020 | .020 | .525 | .543 |
| SR-244/362-2S-12 IG | 288521 | 3000-7000 | 244 | 252 | 294 | 302 | 112 | .020 | .020 | .543 | .561 |
| SR-252/374-2S-12 IG | 288531 | 3400-7200 | 252 | 256 | 302 | 306 | 112 | .020 | .020 | .561 | .561 |
| R-268/420-2S-10     | 288811 | 4200-7800 | 268 | 276 | 300 | 308 | 110 | .020 | .020 | .630 | .630 |

**Toyota 20R-22R-22RE 4 cyl. 74-89 - 2189-2666cc**

**Mechanical Follower Camshafts**

|              |          |           |     |     |     |     |     |      |      |      |      |
|--------------|----------|-----------|-----|-----|-----|-----|-----|------|------|------|------|
| T20-262-2-10 | 704-0010 | 1400-4800 | 214 | 224 | 262 | 272 | 110 | .008 | .010 | .416 | .430 |
| T20-272-2-10 | 704-0012 | 1800-5200 | 224 | 234 | 272 | 282 | 110 | .008 | .010 | .430 | .444 |
| T20-282-2-10 | 704-0014 | 2200-5600 | 234 | 244 | 282 | 292 | 110 | .008 | .010 | .444 | .458 |
| T20-292-2-10 | 704-0016 | 2600-6000 | 244 | 254 | 292 | 302 | 110 | .008 | .010 | .458 | .472 |
| T20-302-10   | 704-0100 | 3000-6400 | 254 | 254 | 302 | 302 | 110 | .008 | .010 | .472 | .472 |

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|----------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>   |                                  |                       |  |          |  |   |                               |  |                             |                               |
| Brute low-end torque, smooth idle, daily usage, fuel economy, fuel injection compatible, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.  | H-192/2667-2S-10                 | 800-4200              | 750501 <sup>a</sup>                        | 99278-12 | 192<br>204                                 | 248<br>260                                    | 110                           | (9) 21<br>37 (13)                            | .000<br>.000                | .427<br>.456                  |
|   |                                  |                       | 3  |          |  |   |                               |  |                             |                               |
| Good low-end torque, smooth idle, daily usage, fuel economy, fuel injection compatible, off road, towing, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.   | H-260-2                          | 1200-4800             | 753901 <sup>a</sup>                        | 99278-12 | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000                | .456<br>.484                  |
|   |                                  |                       | 3  |          |  |   |                               |  |                             |                               |
| Good low and midrange torque, good idle, daily usage and off road, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.   | H-272-2                          | 1800-5400             | 753941 <sup>a</sup>                        | 99278-12 | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000                | .484<br>.512                  |
|   |                                  |                       | 3  |          |  |   |                               |  |                             |                               |
| Performance usage, good mid and upper RPM HP, serious off road, limited oval track, 10.25 to 11.75 compression ratio advised.   | H-222/3200-2-8                   | 2600-6200             | 750591 <sup>a</sup>                        | 99278-12 | 222<br>232                                 | 294<br>304                                    | 108                           | 8 34<br>49 3                                 | .000<br>.000                | .512<br>.538                  |
|   |                                  |                       | 3  |          |  |   |                               |  |                             |                               |
| <b>Mechanical Lifter Camshafts</b>  |                                  |                       |  |          |  |   |                               |  |                             |                               |
| Good low-end torque, good idle, daily performance usage, good low and mid-range HP, 3200-3600 cruise RPM, 9.5 to 10.75 compression ratio advised.   | F-228/3334-2-12                  | 2200-6000             | 751101 <sup>a</sup>                        | 99260-12 | 228<br>238                                 | 264<br>274                                    | 112                           | 7 41<br>56 2                                 | .028<br>.030                | .533<br>.555                  |
|   |                                  |                       | 3  |          |  |   |                               |  |                             |                               |
| Good mid range torque and HP, fair idle, moderate performance usage, serious off-road usage, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised. Good w/plate nitrous system. | F-238/3467-2-8                   | 2800-6600             | 751121 <sup>a</sup>                        | 99260-12 | 238<br>248                                 | 264<br>274                                    | 108                           | 16 42<br>57 11                               | .028<br>.030                | .555<br>.576                  |
|   |                                  |                       | 3  |          |  |   |                               |  |                             |                               |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT NOTE:** The 1999-05 4.0 litre engines have a camshaft with a different nose configuration. Our camshafts listed above can be used in these engines if the following factory parts are used: 53020443 gear, 53020444 chain, 53020445 gear, and 83502890 bolt kit.

**NOTE:** To provide the most accurate valve adjustment on hydraulic lifter camshafts for 1964-early 1972 engines, special length pushrods can be ordered. Refer to page 305 for special

pushrod ordering instructions and page 374 for checking your hydraulic lifter preload. For late 1972-1998 engines, the rocker stands can be shimmed or longer pushrods installed to provide the proper hydraulic lifter preload. For mechanical camshafts in late 1972-05 engines, screw-in rocker arm studs and pushrod guideplates must be installed to effect valve adjustment. Special order heat treated pushrods are required for use with guideplates.

**IMPORTANT:** For late 1972-05 engines, if your preload is excessive, this can be remedied by using Crane's

**Rocker Arm Bridge Shim Kit (99179-1).** Refer to page 324 for details.

**NOTE:** 1974 American Motors/Jeep 232 and 258 cu.in. engines were equipped with exhaust valve rotators and 11/32" stem exhaust valves. In these instances use 3 of 99936-2 valve spring retainers and 3 of 99820-2 valve seals (on exhaust valves only) to prevent excessive valve spring shimming.

**NOTE:** 1987-05 American Motors/Jeep 4.0 litre engines are equipped with 5/16" stem valves, requiring appropriate retainers and valve stem seals as indicated.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>                             | <i>See pg. 350</i>    | <i>See pg. 362</i>                                 | <i>See pg. 360</i> | <i>See pg. 306</i> | <i>See pg. 328</i>             | <i>See pg. 312</i> | <i>See pg. 315</i>                                  | <i>See pg. 317</i> |
|--------------------------------|--|-----------------------|--|--------------------|--------------------|--------------------------------|--------------------|---|--------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                  | RETAINERS             | VALVE STEM SEALS                                   | VALVE STEM LOCKS   | PUSHRODS           | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE          |
|                                | 96803-12 <sup>b</sup><br>96806-12 <sup>c</sup> | 99948-12 <sup>b</sup> | 99822-12 <sup>b,d</sup><br>99824-12 <sup>c,d</sup> |                    |                    |                                |                    |   |                    |
|                                | 96803-12 <sup>b</sup><br>96806-12 <sup>c</sup> | 99948-12 <sup>b</sup> | 99822-12 <sup>b,d</sup><br>99824-12 <sup>c,d</sup> |                    |                    |                                |                    |   |                    |
|                                | 96803-12 <sup>b</sup><br>96806-12 <sup>c</sup> | 99948-12 <sup>b</sup> | 99822-12 <sup>b,d</sup><br>99824-12 <sup>c,d</sup> |                    |                    |                                |                    |   |                    |
|                                | 96803-12 <sup>b</sup><br>96806-12 <sup>c</sup> | 99948-12 <sup>b</sup> | 99822-12 <sup>b,d</sup><br>99824-12 <sup>c,d</sup> |                    |                    |                                |                    |   |                    |
|                                | 96838-12 <sup>d</sup>                          | 99948-12 <sup>b</sup> | 99822-12 <sup>b,d</sup><br>99824-12 <sup>c,d</sup> |                    |                    |                                |                    |   |                    |
|                                | 96838-12 <sup>d</sup>                          | 99948-12 <sup>b</sup> | 99822-12 <sup>b,d</sup><br>99824-12 <sup>c,d</sup> |                    |                    |                                |                    |   |                    |

- a To install these camshafts in 1995-05 4.0 litre engines, see the IMPORTANT NOTE on the opposite page.
- b Except 4.0 litre engines.
- c For 4.0 litre engines.
- d Must machine cylinder head.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                           | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>   |                                  |                       |  |                                   |  |   |                               |  |                             |                               |
| Brute low-end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.   | H-192/2667-2S-10                 | 800-4200              | 860501*                                    | 99278-16                          | 192<br>204                                 | 248<br>260                                    | 110                           | (9) 21<br>37 (13)                            | .000<br>.000                | .427<br>.456                  |
|   |                                  |                       | ⚡  |                                   |  |   |                               |  |                             |                               |
| Great low-end torque, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2800 cruise RPM, 8.0 to 9.5 compression ratio advised.  | H-260-2                          | 1200-4800             | 863901*<br>863902 <sup>1a</sup>            | 99278-16                          | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000                | .456<br>.484                  |
|   |                                  |                       | ⚡  |                                   |  |   |                               |  |                             |                               |
| Good low and mid range torque, good idle, daily usage and off road, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.                            | H-272-2                          | 1800-5400             | 863941*<br>863942 <sup>1a</sup>            | 99278-16                          | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000                | .484<br>.512                  |
|   |                                  |                       | ⚡  |                                   |  |   |                               |  |                             |                               |
| Good mid range torque and HP, good idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, mild supercharged, mild nitrous, 9.5 to 10.75 compression ratio advised.                 | H-278-2                          | 2200-5800             | 863801*<br>863802 <sup>1a</sup>            | 99278-16<br>99378-16 <sup>b</sup> | 222<br>234                                 | 278<br>290                                    | 114                           | 2 40<br>56 (2)                               | .000<br>.000                | .498<br>.527                  |
|   |                                  |                       | ⚡  |                                   |  |   |                               |  |                             |                               |
| Good mid range to upper RPM torque and HP, good idle, moderate performance usage, bracket racing, 3200-3600 cruise RPM, 9.5 to 11.0 compression ratio advised.  | H-288-2                          | 2400-6000             | 864441*<br>864442 <sup>1a</sup>            | 99278-16<br>99378-16 <sup>b</sup> | 226<br>230                                 | 288<br>292                                    | 112                           | 6 40<br>52 (2)                               | .000<br>.000                | .488<br>.496                  |
|   |                                  |                       | ⚡  |                                   |  |   |                               |  |                             |                               |
| Good mid range to upper RPM torque, rough idle, moderate performance usage, serious off road, bracket racing, 3200-3600 cruise RPM, 10.0 to 11.0 compression ratio advised.                           | H-232/310-8                      | 2800-6200             | 860641*                                    | 99278-16<br>99378-16 <sup>b</sup> | 232<br>232                                 | 312<br>312                                    | 108                           | 14 38<br>50 2                                | .000<br>.000                | .496<br>.496                  |
|   |                                  |                       | ⚡  |                                   |  |   |                               |  |                             |                               |
| Good mid to upper RPM HP, rough idle, performance usage, auto trans w/2500+ converter, 3400-3800 cruise RPM, mild nitrous, supercharged 10-14#, 10.0 to 11.5 compression ratio advised.               | H-302-2                          | 3000-6600             | 864561*                                    | 99278-16<br>99378-16 <sup>b</sup> | 232<br>242                                 | 302<br>312                                    | 112                           | 9 43<br>58 4                                 | .000<br>.000                | .538<br>.563                  |
|   |                                  |                       | ⚡  |                                   |  |   |                               |  |                             |                               |
| Good upper RPM HP, rough idle, performance usage, bracket racing, 390 cu.in., auto trans w/3500+ converter, 3800-4200 cruise RPM, mild nitrous, 11.0 to 12.5 compression ratio advised.               | H-242/3520-2-12                  | 3400-7000             | 860661*                                    | 99278-16<br>99378-16 <sup>b</sup> | 242<br>252                                 | 314<br>324                                    | 112                           | 14 48<br>63 9                                | .000<br>.000                | .563<br>.589                  |
|   |                                  |                       | ⚡  |                                   |  |   |                               |  |                             |                               |
| Moderate competition only, rough idle, good upper RPM HP, bracket racing, 401+ cu.in., auto trans w/4000+ converter, good with aluminum heads, plate nitrous, 12.5 minimum compression ratio advised. | H-252/3680-2-10                  | 4000-7200             | 860681*                                    | 99278-16<br>99378-16 <sup>b</sup> | 252<br>262                                 | 324<br>334                                    | 110                           | 21 51<br>66 16                               | .000<br>.000                | .589<br>.614                  |
|   |                                  |                       | ⚡  |                                   |  |   |                               |  |                             |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**NOTE:** To provide the most accurate valve adjustment on hydraulic lifter camshafts for 1966-1973 engines, a set of positive locking nuts should be obtained for the rocker arm studs. For 1974-1991 engines, the rocker stands can be shimmed, or longer pushrods installed to provide the proper hydraulic lifter preload. Special order heat treated pushrods are required for use with guideplates.

**IMPORTANT:** If your hydraulic lifter preload is excessive, this can be easily remedied by using Crane's Rocker Arm Bridge Shim Kit (99179-1). Refer to page 324 for details.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. Refer to page 305 for special pushrod ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some 1978 and 1979 engines may not be able to obtain the

correct valve spring assembled height with the components listed. Different springs and retainers may be required. Contact Crane's Performance Consultants for details.

**NOTE:** 1973 and 1974 American Motors/Jeep 360 and 401 cu.in. engines are equipped with exhaust valve rotators and 11/32" stem exhaust valves. In these instances, use 4 of 99936-2 valve spring retainers and 99820-8 valve seals (on the exhaust valves only) to prevent excessive valve spring shimming.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360          | See pg. 306           | See pg. 328                    | See pg. 312       | See pg. 315                                      | See pg. 317                                      |
|--------------------------------|-----------------------|-------------|-----------------------|----------------------|-----------------------|--------------------------------|-------------------|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ ENERGIZER              | ROCKERS — GOLD RACE                              |
| 64308-1 <sup>c</sup>           | 99839-16 <sup>c</sup> | 99957-16    |                       | 99098-1 <sup>e</sup> | 95637-16 <sup>f</sup> | 86977-1 <sup>h</sup>           |                   | 36774-16 <sup>h,i</sup><br>11746-16 <sup>j</sup> | 36750-16 <sup>k,i</sup><br>86757-16 <sup>l</sup> |
| 64308-1 <sup>c</sup>           | 99839-16 <sup>c</sup> | 99957-16    |                       | 99098-1 <sup>e</sup> | 95637-16 <sup>f</sup> | 86977-1 <sup>g</sup>           |                   | 36774-16 <sup>h,i</sup><br>11746-16 <sup>j</sup> | 36750-16 <sup>k,i</sup><br>86757-16 <sup>l</sup> |
| 64308-1 <sup>c</sup>           | 99839-16 <sup>c</sup> | 99957-16    |                       | 99098-1 <sup>e</sup> | 95637-16 <sup>f</sup> | 86977-1 <sup>g</sup>           |                   | 36774-16 <sup>h,j</sup><br>11746-16 <sup>j</sup> | 36750-16 <sup>k,j</sup><br>86757-16 <sup>j</sup> |
| 64308-1 <sup>c</sup>           | 99839-16 <sup>c</sup> | 99957-16    |                       | 99098-1 <sup>e</sup> | 95637-16 <sup>f</sup> | 86977-1 <sup>g</sup>           |                   | 36774-16 <sup>h,i</sup><br>11746-16 <sup>j</sup> | 36750-16 <sup>k,i</sup><br>86757-16 <sup>l</sup> |
| 64308-1 <sup>c</sup>           | 99839-16 <sup>c</sup> | 99957-16    |                       | 99098-1 <sup>e</sup> | 95637-16 <sup>f</sup> | 86977-1 <sup>g</sup>           |                   | 36774-16 <sup>h,i</sup><br>11746-16 <sup>j</sup> | 36750-16 <sup>k,i</sup><br>86757-16 <sup>l</sup> |
|                                | 99838-16 <sup>d</sup> | 99948-16    |                       | 99098-1 <sup>e</sup> | 95637-16 <sup>f</sup> | 86977-1 <sup>g</sup>           |                   | 36774-16 <sup>h,i</sup><br>11746-16 <sup>j</sup> | 36750-16 <sup>k,i</sup><br>86757-16 <sup>l</sup> |
|                                | 99838-16 <sup>d</sup> | 99948-16    | 99822-16 <sup>d</sup> | 99098-1 <sup>e</sup> | 95637-16 <sup>f</sup> | 86977-1 <sup>g</sup>           |                   | 36774-16 <sup>h,i</sup><br>11746-16 <sup>j</sup> | 36750-16 <sup>k,i</sup><br>86757-16 <sup>l</sup> |
|                                | 99838-16 <sup>d</sup> | 99948-16    | 99822-16 <sup>d</sup> | 99098-1 <sup>e</sup> | 95637-16 <sup>f</sup> | 86977-1 <sup>g</sup>           |                   | 36774-16 <sup>h,i</sup><br>11746-16 <sup>j</sup> | 36750-16 <sup>k,i</sup><br>86757-16 <sup>l</sup> |
|                                | 99893-16 <sup>d</sup> | 99954-16    | 99822-16 <sup>d</sup> | 99098-1 <sup>e</sup> | 95637-16 <sup>f</sup> | 86977-1 <sup>g</sup>           |                   | 36774-16 <sup>h,i</sup><br>11746-16 <sup>j</sup> | 36750-16 <sup>k,i</sup><br>86757-16 <sup>l</sup> |

- a Cam and lifter kit, includes installation lubricants and Rocker Arm Bridge Shim Kit.
- b Optional Hi Intensity hydraulic lifters, see page 292 for details.
- c Contains standard diameter valve springs, no machining required.
- d Must machine cylinder heads.
- e Machined steel, heat treated, for engines with single groove valve stems.
- f Pro Series one-piece, for 1970-1991 304 thru 401 engines.
- g Pro Series steel billet gears and roller chain with thrust bearing.
- h Crane Classic extruded, 1.6 ratio, 3/8" stud.

- i Must machine 74-91 cylinder heads and install **99156-16** 3/8" rocker arm studs (or **99157-16** 7/16" rocker arm studs for **86757-16** rockers) and aftermarket pushrod guideplates. Special order heat-treated pushrods are required for use with guideplates. See page 305 for special pushrod ordering instructions.
- j Energizer, 1.6 ratio, 3/8" stud.
- k 1.6 ratio, 3/8" stud.
- l 1.6 ratio, 7/16" stud.

## COMPLETE CAM SPECIFICATIONS

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | See pg. 293<br>LIFTERS | Degrees             | Advertised          | Degrees            | Open/Close                     | Lash                | Gross                |
|--|----------------------------------|-----------------------|--|------------------------|---------------------|---------------------|--------------------|--------------------------------|---------------------|----------------------|
|  |                                  |                       |  |                        | Duration<br>@ .050" | Degrees<br>Duration | Lobe<br>Separation | @ .050"<br>Cam Lift<br>Int/Exh | Hot<br>Int.<br>Exh. | Lift<br>Int.<br>Exh. |
| <b>Hydraulic Roller Camshafts — Retrofit</b>   |                                  |                       |  |                        |                     |                     |                    |                                |                     |                      |
| Brute low end torque and HP, good idle, daily usage, performance and fuel efficiency, towing, 2200-3000 cruise RPM, 8.0 to 9.5 compression ratio advised.  | HR-208/3313-2S-12                | 1000-5200             | 869501*                                    | 86532-16 <sup>a</sup>  | 208<br>216          | 264<br>272          | 112                | (3) 31<br>45 (9)               | .000<br>.000        | .530<br>.530         |
| Excellent low end torque and HP, good idle, daily usage, off road, performance and fuel efficiency, mild turbocharged, 2600-3400 cruise RPM, 8.75 to 10.5 compression ratio advised.   | HR-216/325-2S-12                 | 1600-5600             | 869511*                                    | 86532-16 <sup>a</sup>  | 216<br>224          | 278<br>286          | 112                | 1 35<br>49 (5)                 | .000<br>.000        | .520<br>.542         |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, serious off road, mild bracket racing, auto trans w/2500+ converter, 3000-3800 cruise RPM, 9.5 to 10.75 compression ratio advised.                    | HR-224/339-2S-12                 | 2000-6000             | 869521*                                    | 86532-16 <sup>a</sup>  | 224<br>232          | 286<br>294          | 112                | 5 39<br>53 (1)                 | .000<br>.000        | .542<br>.563         |
| Good mid range torque and HP, fair idle, moderate performance usage, serious off road, mild bracket racing, 390+ cu.in., auto trans w/2800+ converter, 3400-4200 cruise RPM, 10.0 to 11.5 compression ratio advised.                   | HR-232/352-2S-10                 | 2600-6600             | 869531*                                    | 86532-16 <sup>a</sup>  | 232<br>240          | 294<br>302          | 110                | 11 41<br>55 5                  | .000<br>.000        | .563<br>.584         |
| Good upper RPM torque and HP, rough idle, performance usage, professional off road, bracket racing, 401+ cu.in., auto trans w/3500+ converter, good with aluminum heads, 4000-4800 cruise RPM, 11.0 to 12.5 compression ratio advised. | HR-244/372-2S-12                 | 3200-7000             | 869541*                                    | 86532-16 <sup>a</sup>  | 244<br>256          | 306<br>318          | 112                | 15 49<br>65 11                 | .000<br>.000        | .595<br>.595         |
| <b>Mechanical Lifter Camshafts</b>   |                                  |                       |  |                        |                     |                     |                    |                                |                     |                      |
| Good mid range torque and HP, fair idle, moderate performance usage, off road, 3200-3600 cruise RPM, 10.0 to 11.5 compression ratio advised.   | F-238/3200-2-12                  | 2800-6400             | 861201*                                    | 99260-16               | 238<br>248          | 300<br>310          | 112                | 12 46<br>61 7                  | .022<br>.022        | .512<br>.533         |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, 3800-4200 cruise RPM, serious off road, 10.5 to 12.0 compression ratio advised.  | F-248/3334-2-12                  | 3400-7000             | 861241*                                    | 99260-16               | 248<br>258          | 310<br>320          | 112                | 17 51<br>66 12                 | .022<br>.022        | .533<br>.555         |
| Good upper RPM torque and HP, rough idle, performance usage, serious off road, bracket racing, 390+ cu.in., auto w/3500+ converter, good with aluminum heads, 11.0 to 12.5 compression ratio advised.                                  | F-258/3468-8                     | 4000-7400             | 861321*                                    | 99260-16               | 258<br>258          | 320<br>320          | 108                | 26 52<br>62 16                 | .022<br>.022        | .555<br>.555         |
| <b>Mechanical Roller Camshafts</b>   |                                  |                       |  |                        |                     |                     |                    |                                |                     |                      |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, serious off road, mild bracket racing, auto trans w/2500+ converter, 3200-3600 cruise RPM, 10.0 to 11.25 compression ratio advised.                   | SR-236/350-2S-10                 | 2600-6600             | 868511*                                    | 66550-16 <sup>b</sup>  | 236<br>244          | 286<br>294          | 110                | 13 43<br>57 7                  | .020<br>.020        | .560<br>.579         |
| Competition only, good mid and upper RPM torque and HP, oval track, bracket racing, auto trans w/3500+ converter, professional off road, 11.5 minimum compression ratio advised.   | R-258/420-2S-6                   | 3800-7800             | 868821*                                    | 66550-16 <sup>b</sup>  | 258<br>266          | 290<br>298          | 106                | 26 52<br>62 24                 | .020<br>.020        | .672<br>.672         |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**NOTE:** Hydraulic roller camshafts require special length pushrods. Refer to page 305 for special pushrod ordering instructions, and page 374 for checking your lifter preload. To provide the most accurate valve adjustment on hydraulic roller lifter camshafts, screw-in rocker arm studs and pushrod guideplates can be installed to effect valve adjustment.

**NOTE:** For mechanical or roller lifter camshafts, screw-in rocker arm studs and pushrod guideplates must be installed to effect valve adjustment. Special order heat treated pushrods are required for use with guideplates. Refer to page 305 for special pushrod ordering instructions.

**NOTE:** Some 1978 and 1979 engines may not be able to obtain the correct valve spring assembled height with the components listed. Different springs and retainers may be required.

Contact Crane's Performance Consultants for details. 1973 and 1974 American Motors/Jeep 360 and 401 cu.in. engines are equipped with exhaust valve rotators and 11/32" stem exhaust valves. In these instances, use 4 of 99936-2 valve spring retainers and 99820-8 valve seals (on the exhaust valves only) to prevent excessive valve spring shimming.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360          | See pg. 306           | See pg. 328                    | See pg. 312       | See pg. 315  | See pg. 317  |
|--------------------------------|-----------------------|-------------|-----------------------|----------------------|-----------------------|--------------------------------|-------------------|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ ENERGIZER                | ROCKERS — GOLD RACE                                |
|                                | 99893-16 <sup>c</sup> | 99954-16    | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 95622-16 <sup>e</sup> | 86977-1 <sup>f</sup>           |                   | 36774-16 <sup>g,h</sup><br>11746-16 <sup>i,h</sup> | 36750-16 <sup>j,h</sup><br>86757-16 <sup>k,h</sup> |
|                                | 99893-16 <sup>c</sup> | 99954-16    | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 95622-16 <sup>e</sup> | 86977-1 <sup>f</sup>           |                   | 36774-16 <sup>g,h</sup><br>11746-16 <sup>i,h</sup> | 36750-16 <sup>j,h</sup><br>86757-16 <sup>k,h</sup> |
|                                | 99893-16 <sup>c</sup> | 99954-16    | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 95622-16 <sup>e</sup> | 86977-1 <sup>f</sup>           |                   | 36774-16 <sup>g,h</sup><br>11746-16 <sup>i,h</sup> | 36750-16 <sup>j,h</sup><br>86757-16 <sup>k,h</sup> |
|                                | 99893-16 <sup>c</sup> | 99954-16    | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 95622-16 <sup>e</sup> | 86977-1 <sup>f</sup>           |                   | 36774-16 <sup>g,h</sup><br>11746-16 <sup>i,h</sup> | 36750-16 <sup>j,h</sup><br>86757-16 <sup>k,h</sup> |
|                                | 99893-16 <sup>c</sup> | 99954-16    | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 95622-16 <sup>e</sup> | 86977-1 <sup>f</sup>           |                   | 36774-16 <sup>g,h</sup><br>11746-16 <sup>i,h</sup> | 36750-16 <sup>j,h</sup><br>86757-16 <sup>k,h</sup> |
|                                | 99838-16 <sup>c</sup> | 99948-16    | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 95641-16 <sup>e</sup> | 86977-1 <sup>f</sup>           |                   | 36774-16 <sup>g,h</sup>                            | 36750-16 <sup>j,h</sup><br>86757-16 <sup>k,h</sup> |
|                                | 99838-16 <sup>c</sup> | 99954-16    | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 95641-16 <sup>e</sup> | 86977-1 <sup>f</sup>           |                   | 36774-16 <sup>g,h</sup>                            | 36750-16 <sup>j,h</sup><br>86757-16 <sup>k,h</sup> |
|                                | 99838-16 <sup>c</sup> | 99954-16    | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 95641-16 <sup>e</sup> | 86977-1 <sup>f</sup>           |                   | 36774-16 <sup>g,h</sup>                            | 36750-16 <sup>j,h</sup><br>86757-16 <sup>k,h</sup> |
|                                | 99838-16 <sup>c</sup> | 99954-16    | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 95645-16 <sup>e</sup> | 86977-1 <sup>f</sup>           |                   | 36774-16 <sup>g,h</sup>                            | 36750-16 <sup>j,h</sup><br>86757-16 <sup>k,h</sup> |
|                                | 99876-16 <sup>c</sup> | 99963-16    | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 95645-16 <sup>e</sup> | 86977-1 <sup>f</sup>           |                   | 36774-16 <sup>g,h</sup>                            | 36750-16 <sup>j,h</sup><br>86757-16 <sup>k,h</sup> |

- a Special length pushrods are required.
- b Ultra Pro Series roller lifters, with .200" height pushrod seats, special length pushrods are required.
- c Must machine cylinder heads.
- d Machined steel, heat treated for engines with single groove valve stems.
- e Pro Series one piece, for 1970-1995 304 thru 401 engines.
- f Pro Series stell billet gears and roller chain with thrust bearing.
- g Crane Classic extruded, 1.6 ratio, 3/8" stud.
- h Must machine 74-91 cylinder heads and install 99156-16 rocker arm studs and aftermarket pushrod guideplates. Special order heat-treated pushrods are required for use with guideplates. See page 305 for special pushrod ordering instructions.
- i Energizer, 1.6 ratio, 3/8" stud.
- j 1.6 ratio, 3/8" stud.
- k 1.6 ratio, 7/16" stud.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                           | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |                                   |  |   |                               |  |                             |                               |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.  | H-194/250-25-10                  | 800-4200              | 850501*                                    | 99284-16                          | 194<br>202                                 | 252<br>260                                    | 110                           | (8) 22<br>36 (14)                            | .000<br>.000                | .400<br>.416                  |
| Good low end torque, smooth idle, daily usage, towing, performance and fuel efficiency, 2200-2800 cruise RPM, 8.0 to 9.5 compression ratio advised.                                | H-202/260-25-10                  | 1200-4800             | 850521*                                    | 99284-16                          | 202<br>210                                 | 260<br>268                                    | 110                           | (4) 26<br>40 (10)                            | .000<br>.000                | .416<br>.432                  |
| Good low to mid range torque, good idle, daily usage, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.                       | H-218/280-25-12                  | 1800-5400             | 850571*                                    | 99284-16                          | 218<br>226                                 | 276<br>284                                    | 112                           | 2 36<br>50 (4)                               | .000<br>.000                | .448<br>.464                  |
| Good mid range torque, fair idle, moderate performance usage, good mid-range HP, excellent for 455GS, bracket racing, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised. | H-226/290-25-10                  | 2200-5800             | 850631*                                    | 99284-16<br>99384-16 <sup>a</sup> | 226<br>234                                 | 284<br>292                                    | 110                           | 8 38<br>52 2                                 | .000<br>.000                | .464<br>.480                  |
| Replacement for factory Stage 2 camshaft.  | BluePrinted<br>1385557           | 2200-5800             | 850421*                                    | 99284-16<br>99384-16 <sup>a</sup> | 226<br>255                                 | 312<br>332                                    | 115                           | 4.5 41.5<br>69 6                             | .000<br>.000                | .453<br>.482                  |
| Rough idle, performance usage, good mid-range HP, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised.  | H-242/310-25-10                  | 2800-6600             | 850671*                                    | 99284-16<br>99384-16 <sup>a</sup> | 242<br>250                                 | 300<br>308                                    | 110                           | 16 46<br>60 10                               | .000<br>.000                | .496<br>.512                  |
| Performance usage, good upper RPM HP for large displacement engines, bracket racing, auto trans w/race converter, also nitrous, 12.0 minimum compression ratio advised.            | H-252/348-25-12                  | 3600-6800             | 850701*                                    | 99284-16<br>99384-16 <sup>a</sup> | 252<br>260                                 | 322<br>330                                    | 112                           | 19 53<br>37 13                               | .000<br>.000                | .557<br>.576                  |

CAMSHAFTS

# Cadillac V-8 68-81

## Hydraulic Lifter Camshafts

|   |                 |           |          |                                   |            |            |     |                   |              |              |
|---|-----------------|-----------|----------|-----------------------------------|------------|------------|-----|-------------------|--------------|--------------|
| Excellent low end torque, smooth idle, daily usage, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.                        | H-202/260-25-14 | 1200-4800 | 1020541* | 99284-16                          | 202<br>210 | 260<br>268 | 114 | (8) 30<br>44 (14) | .000<br>.000 | .447<br>.464 |
| Good low end torque, good idle, daily usage, towing, economy, mild marine usage, airboat, mild turbocharged, 2400-2800 cruise RPM, 8.5 to 10.0 compression ratio advised.       | H-210/270-25-12 | 1400-5200 | 1020561* | 99284-16                          | 210<br>218 | 268<br>276 | 112 | (2) 32<br>46 (8)  | .000<br>.000 | .464<br>.482 |
| Good low and mid range torque, good idle, daily usage, performance, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.   | H-218/280-25-12 | 1800-5600 | 1020571* | 99284-16                          | 218<br>226 | 276<br>284 | 112 | 2 36<br>50 (4)    | .000<br>.000 | .482<br>.499 |
| Good mid range torque and HP, fair idle, moderate performance usage, bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised. | H-226/290-25-12 | 2200-5800 | 1020631* | 99284-16<br>99384-16 <sup>a</sup> | 226<br>234 | 284<br>292 | 112 | 6 40<br>54 0      | .000<br>.000 | .499<br>.516 |
| Rough idle, performance usage, good mid and upper RPM torque and HP, bracket racing, auto trans w/3000+ converter, 10.0 to 11.5 compression ratio advised.                      | H-234/300-25-12 | 2800-6400 | 1020641* | 99284-16<br>99384-16 <sup>a</sup> | 234<br>242 | 292<br>300 | 112 | 10 44<br>58 4     | .000<br>.000 | .516<br>.533 |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.  
NOTE: Mechanical lifter camshafts and components are available on special order.

NOTE: To provide the most accurate valve adjustment on hydraulic lifter camshafts, special length pushrods can be ordered. Refer to page 305 for special pushrod ordering instructions, and page 374 for checking your hydraulic lifter preload.

IMPORTANT: Adjustable Vacuum Advance Kits available. See page 333 for details.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i> | <i>See pg. 350</i> | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>     | <i>See pg. 328</i>             | <i>See pg. 312</i> | <i>See pg. 315</i>                                  | <i>See pg. 317</i> |
|--------------------------------|--------------------|--------------------|-----------------------|----------------------|------------------------|--------------------------------|--------------------|---|--------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS      | RETAINERS          | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS               | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE          |
|                                | 99838-16           | 99910-16           | 99822-16 <sup>b</sup> |                      |                        |                                |                    |   |                    |
|                                | 99838-16           | 99910-16           | 99822-16 <sup>b</sup> |                      |                        |                                |                    |   |                    |
|                                | 99838-16           | 99910-16           | 99822-16 <sup>b</sup> |                      |                        |                                |                    |   |                    |
|                                | 99838-16           | 99910-16           | 99822-16 <sup>b</sup> |                      |                        |                                |                    |   |                    |
|                                | 99838-16           | 99910-16           | 99822-16 <sup>b</sup> |                      |                        |                                |                    |   |                    |
|                                | 99838-16           | 99910-16           | 99822-16 <sup>b</sup> |                      |                        |                                |                    |   |                    |
|                                | 99838-16           | 99910-16           | 99822-16 <sup>b</sup> |                      |                        |                                |                    |   |                    |
|                                | 99848-16           | 99916-16           | 99820-16 <sup>b</sup> | 99097-1 <sup>c</sup> | 102621-16 <sup>d</sup> |                                |                    |   |                    |
|                                | 99848-16           | 99916-16           | 99820-16 <sup>b</sup> | 99097-1 <sup>c</sup> | 102621-16 <sup>d</sup> |                                |                    |   |                    |
|                                | 99848-16           | 99916-16           | 99820-16 <sup>b</sup> | 99097-1 <sup>c</sup> | 102621-16 <sup>d</sup> |                                |                    |   |                    |
|                                | 99848-16           | 99916-16           | 99820-16 <sup>b</sup> | 99097-1 <sup>c</sup> | 102621-16 <sup>d</sup> |                                |                    |   |                    |
|                                | 99848-16           | 99916-16           | 99820-16 <sup>b</sup> | 99097-1 <sup>c</sup> | 102621-16 <sup>d</sup> |                                |                    |   |                    |

a Optional Hi Intensity hydraulic lifters, see page 292 for details.  
b Must machine cylinder heads.  
c Machined steel, heat treated.  
d Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>   |                                  |                       |  |                 |  |   |                               |  |                     |                               |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.   | <b>H-192/2667-2S-12</b>          | 800-4200              | <b>200511*</b>                             | <b>99277-12</b> | 192<br>204                                 | 248<br>260                                    | 112                           | (11) 23<br>39 (15)                           | .000<br>.000        | .467<br>.498                  |
|   |                                  |                       | ⚡  |                 |  |   |                               |  |                     |                               |
| Good low end torque, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.             | <b>H-260-2</b>                   | 1200-4800             | <b>203901*</b>                             | <b>99277-12</b> | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000        | .498<br>.530                  |
|   |                                  |                       | ⚡  |                 |  |   |                               |  |                     |                               |
| Good low to mid range torque, good idle, daily usage and off road, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised. | <b>H-272-2</b>                   | 1800-5400             | <b>204541*</b>                             | <b>99277-12</b> | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000        | .530<br>.560                  |
|   |                                  |                       | ⚡  |                 |  |   |                               |  |                     |                               |
| Performance usage, good mid range to upper RPM torque and HP, oval track, radical off road, 10.5 minimum compression ratio advised.                                       | <b>H-234/3250-2-6</b>            | 3000-6000             | <b>200541*</b>                             | <b>99277-12</b> | 234<br>244                                 | 304<br>314                                    | 106                           | 15 39<br>52 12                               | .000<br>.000        | .569<br>.593                  |
|   |                                  |                       | ⚡  |                 |  |   |                               |  |                     |                               |
| <b>Mechanical Lifter Camshafts</b>  |                                  |                       |  |                 |  |   |                               |  |                     |                               |
| Good mid range torque and HP, fair idle, moderate performance usage, 1/4-3/8 oval track, off road, 3400-3800 cruise RPM, 10.0 to 11.5 compression ratio advised.          | <b>F-238/3200-2-8</b>            | 2800-6600             | <b>201141*</b>                             | <b>99250-12</b> | 238<br>248                                 | 304<br>314                                    | 108                           | 16 42<br>57 11                               | .022<br>.022        | .560<br>.583                  |
|   |                                  |                       | ⚡  |                 |  |   |                               |  |                     |                               |
| Rough idle, performance usage, good mid and upper RPM HP, 3/8-1/2 oval track, bracket racing, 11.0 to 12.5 compression ratio advised.                                     | <b>F-248/3334-2-6</b>            | 3400-6800             | <b>201221*</b>                             | <b>99250-12</b> | 248<br>258                                 | 310<br>320                                    | 106                           | 22 46<br>59 19                               | .022<br>.022        | .583<br>.607                  |
|   |                                  |                       | ⚡  |                 |  |   |                               |  |                     |                               |
| Performance usage, good mid and upper RPM HP, bracket racing, long unlimited oval track, 12.25 minimum compression ratio advised.   | <b>F-256/3634-2S-8</b>           | 4200-7200             | <b>201311*</b>                             | <b>99250-12</b> | 256<br>260                                 | 292<br>296                                    | 108                           | 23 53<br>61 19                               | .026<br>.026        | .636<br>.646                  |
|   |                                  |                       | ⚡  |                 |  |   |                               |  |                     |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**NOTE:** Roller camshafts and components are available on special order. See page 369 regarding outright steel billet camshafts.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

**NOTE:** The 1963-84 Chevrolet I6 292 cu. in. engines use a different camshaft core than the 194-230-250 engines, and are not interchangeable.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i> | <i>See pg. 350</i> | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>                             | <i>See pg. 328</i>   | <i>See pg. 312</i> | <i>See pg. 315</i>                                  | <i>See pg. 317</i>                             |
|--------------------------------|--------------------|--------------------|-----------------------|----------------------|--|----------------------|--------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS      | RETAINERS          | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING GEAR ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 99838-12           | 99944-12           | 99820-12 <sup>a</sup> | 99097-1 <sup>b</sup> | 20621-12 <sup>c</sup><br>20622-12 <sup>d</sup> |                      |                    |   | 20750-12 <sup>e</sup><br>13750-12 <sup>f</sup> |
|                                | 99838-12           | 99944-12           | 99820-12 <sup>a</sup> | 99097-1 <sup>b</sup> | 20621-12 <sup>c</sup><br>20622-12 <sup>d</sup> |                      |                    |   | 20750-12 <sup>e</sup><br>13750-12 <sup>f</sup> |
|                                | 99838-12           | 99944-12           | 99820-12 <sup>a</sup> | 99097-1 <sup>b</sup> | 20621-12 <sup>c</sup><br>20622-12 <sup>d</sup> |                      |                    |   | 20750-12 <sup>e</sup><br>13750-12 <sup>f</sup> |
|                                | 99838-12           | 99944-12           | 99820-12 <sup>a</sup> | 99097-1 <sup>b</sup> | 20621-12 <sup>c</sup><br>20622-12 <sup>d</sup> |                      |                    |   | 20750-12 <sup>e</sup><br>13750-12 <sup>f</sup> |
|                                | 99893-12           | 99953-12           | 99820-12 <sup>a</sup> | 99097-1 <sup>b</sup> | 20621-12 <sup>c</sup><br>20622-12 <sup>d</sup> |                      |                    |   | 20750-12 <sup>e</sup><br>13750-12 <sup>f</sup> |
|                                | 99893-12           | 99953-12           | 99820-12 <sup>a</sup> | 99097-1 <sup>b</sup> | 20621-12 <sup>c</sup><br>20622-12 <sup>d</sup> |                      |                    |   | 20750-12 <sup>e</sup><br>13750-12 <sup>f</sup> |
|                                | 99893-12           | 99953-12           | 99820-12 <sup>a</sup> | 99097-1 <sup>b</sup> | 20621-12 <sup>c</sup><br>20622-12 <sup>d</sup> |                      |                    |   | 20750-12 <sup>e</sup><br>13750-12 <sup>f</sup> |

**a** Must machine cylinder head  
**b** Machined steel, heat treated  
**c** Heavy wall, heat treated, for 194-230-250 engines

**d** Heavy wall, heat treated, for 194-230-250 engines, for use with Crane aluminum rocker arms  
**e** 1.7 ratio, 3/8 stud, requires **20622-12** pushrods  
**f** 1.7 ratio, 7/16 stud, requires **20622-12** pushrods

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code  | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|---|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |   |                 |  |   |                               |  |                             |                               |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.  | <b>H-192/2667-2S-12</b>          | 800-4200              | <b>250511*</b>                              | <b>99286-12</b> | 192<br>204                                 | 248<br>260                                    | 112                           | (11) 23<br>39 (15)                           | .000<br>.000                | .400<br>.427                  |
|  |                                  |                       | ◆   |                 |  |   |                               |  |                             |                               |
| Low and mid-range torque and HP, great choice for cars and 4x4 trucks, highway or off road. Works really great for trailer towing.   | <b>2020</b>                      | 800-4200              | <b>254112*<sup>a,b</sup></b>                | <b>99286-12</b> | 198<br>204                                 | 258<br>264                                    | 104                           | (1) 19<br>30 (6)                             | .000<br>.000                | .401<br>.427                  |
|  |                                  |                       | ◆   |                 |  |   |                               |  |                             |                               |
| Mid and upper range torque and HP improver for cars, especially Camaros, S-10 pick-ups, Blazers, Jimmy's, etc., and all performance applications.  | <b>2030</b>                      | 1200-4600             | <b>254122*<sup>a,b</sup></b>                | <b>99286-12</b> | 204<br>214                                 | 264<br>274                                    | 109                           | (3) 27<br>40 (6)                             | .000<br>.000                | .423<br>.423                  |
|  |                                  |                       | ◆   |                 |  |   |                               |  |                             |                               |
| Good low end torque, good idle, daily usage and off road, towing, economy, also mild turbocharged, 2200-3000 cruise RPM, 8.0 to 9.5 compression ratio advised.   | <b>H-260-2</b>                   | 1200-4800             | <b>253901*</b><br><b>253902<sup>b</sup></b> | <b>99286-12</b> | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000                | .427<br>.454                  |
|  |                                  |                       | ◆   |                 |  |   |                               |  |                             |                               |
| Good low to mid range torque, good idle, daily usage & off road, towing, performance & fuel efficiency, increased compress. ratio & gearing advised, 2600-3200 cruise RPM, 8.75 to 10.5 compression ratio advised. | <b>H-272-2</b>                   | 1800-5400             | <b>253941*</b>                              | <b>99286-12</b> | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000                | .454<br>.480                  |
|  |                                  |                       | ◆   |                 |  |   |                               |  |                             |                               |
| Good mid to upper RPM torque and HP, fair idle, serious off road, moderate performance usage, 3000-3600 cruise RPM, 9.75 minimum compression ratio advised.  | <b>H-222/3114-2S-10</b>          | 2200-6000             | <b>250321*</b>                              | <b>99286-12</b> | 222<br>234                                 | 278<br>290                                    | 110                           | 6 36<br>52 2                                 | .000<br>.000                | .467<br>.494                  |
|  |                                  |                       | ◆   |                 |  |   |                               |  |                             |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** These camshafts are for use in distributor equipped engines only.

**IMPORTANT:** Certain 1991 and later engines may have 8mm diameter valve stems. Our 11/32" retainers and valve stem locks will not be applicable in these instances. Some engines also have a 1.600" valve spring assembly height, that will not allow the use of our recommended valve springs and retainers.

**IMPORTANT:** Some engines may have oversize (.010") diameter lifters, check for white paint markings above lifter bores indicating their use.

**NOTE:** Roller camshafts and components are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                      | See pg. 350 | See pg. 362      | See pg. 360                                       | See pg. 306           | See pg. 328                    | See pg. 312       | See pg. 315   | See pg. 317                                    |
|--------------------------------|--|-------------|------------------|---|-----------------------|--------------------------------|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                    | RETAINERS   | VALVE STEM SEALS | VALVE STEM LOCKS                                  | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 99848-12 <sup>c</sup>                            | 99915-12    |                  | 99097-1 <sup>e,f</sup>                            | 25621-12 <sup>g</sup> |                                |                   |   | 25750-12 <sup>h</sup><br>25759-12 <sup>i</sup> |
|                                | 99848-12 <sup>c</sup>                            | 99915-12    |                  | 99097-1 <sup>e,f</sup>                            | 25621-12 <sup>g</sup> |                                |                   |   | 25750-12 <sup>h</sup><br>25759-12 <sup>i</sup> |
|                                | 99848-12 <sup>c</sup>                            | 99915-12    |                  | 99097-1 <sup>e,f</sup>                            | 25621-12 <sup>g</sup> |                                |                   |   | 25750-12 <sup>h</sup><br>25759-12 <sup>i</sup> |
|                                | 99848-12 <sup>c</sup>                            | 99915-12    |                  | 99097-1 <sup>e,f</sup>                            | 25621-12 <sup>g</sup> |                                |                   |   | 25750-12 <sup>h</sup><br>25759-12 <sup>i</sup> |
|                                | 99848-12 <sup>c</sup><br>96802-12 <sup>c,d</sup> | 99915-12    |                  | 99097-1 <sup>e,ff</sup><br>99095-1 <sup>e,f</sup> | 25621-12 <sup>g</sup> |                                |                   |   | 25750-12 <sup>h</sup><br>25759-12 <sup>i</sup> |
|                                | 99848-12 <sup>c</sup><br>96802-12 <sup>c,d</sup> | 99915-12    |                  | 99097-1 <sup>e,f</sup><br>99095-1 <sup>e,f</sup>  | 25621-12 <sup>g</sup> |                                |                   |   | 25750-12 <sup>h</sup><br>25759-12 <sup>i</sup> |

**a** For 1981-89 applications.  
**b** Cam and Lifter Kit, includes installation lubricants.  
**c** Standard diameter valve springs, no machining required.  
**d** Additional assembly height required, use 99095-1 valve stem locks.  
**e** For 11/32" diameter valve stems.  
**f** Machined steel, heat treated.  
**g** For cast iron inline-valve cylinder heads, heavy wall, heat treated, for use with pushrod guideplates.  
**h** 1.5 ratio, narrow body (not self-aligning), with special 10mm x 1.50 bottom x 3/8" x 24 top rocker arm studs included.  
**i** 1.6 ratio, narrow body (not self-aligning), with special 10mm x 1.50 bottom x 3/8" x 24 top rocker arm studs included.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b>  |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Brute low end torque, smooth idle, low and mid-range performance in passenger car, van and truck applications. Great choice for either manual four or five speed or automatic transmission. Greatly improves driveability, especially on the highway. Runs strongest from 2000 RPM and up. | HR-194/271-2-12                  | 800-4600              | 1439801*                                   | 10530-12 <sup>a</sup> | 194  | 250   | 112                           | (10) 24                                      | .000                        | .407                          |
|  |                                  |                       |  |                       | 204  | 260   |                               | 39 (15)                                      | .000                        | .429                          |
| Good low end torque, smooth idle, daily usage, light towing, economy, also mild turbo-charged, 2200-3000 cruise RPM, 8.0 to 9.5 compression ratio advised.   | HR-204/286-2S-12                 | 1200-5200             | 1439811*                                   | 10530-12 <sup>a</sup> | 204  | 260   | 112                           | (5) 29                                       | .000                        | .429                          |
|  |                                  |                       |  |                       | 214  | 276   |                               | 44 (10)                                      | .000                        | .430                          |
| Good low end torque, good idle, daily usage, off road, towing, performance and fuel economy, 2600-3400 cruise RPM, 8.75 to 10.75 compression ratio advised.  | HR-214/325-2S-12                 | 1600-5600             | 1439721*                                   | 10530-12 <sup>a</sup> | 214  | 276   | 112                           | (0) 34                                       | .000                        | .488                          |
|  |                                  |                       |  |                       | 222  | 284   |                               | 48 (6)                                       | .000                        | .509                          |
| Good low and mid range torque, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3000-3800 cruise RPM, 9.5 to 10.75 compress. ratio advised, also mild supercharged.   | HR-222/339-2S-12                 | 2200-6000             | 1439731*                                   | 10530-12 <sup>a</sup> | 222  | 284   | 112                           | (4) 38                                       | .000                        | .509                          |
|  |                                  |                       |  |                       | 230  | 292   |                               | 52 (2)                                       | .000                        | .528                          |
| Good mid to upper RPM torque and HP, fair idle, moderate performance usage, serious off road, bracket racing, auto trans with 2800+ converter, 10.25 to 11.5 compression ratio advised, also mild supercharged.  | HR-230/352-2S-12                 | 2600-6400             | 1439531*                                   | 10530-12 <sup>a</sup> | 230  | 292   | 112                           | 8 42   | .000                        | .528                          |
|  |                                  |                       |  |                       | 234  | 296   |                               | 54 0   | .000                        | .539                          |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**NOTE:** The hydraulic roller camshafts listed above do not have a fuel pump eccentric, therefore a mechanical fuel pump cannot be used with them (as some marine applications may require).

**NOTE:** 1985-91 Chevrolet 90° V-6 262 cu.in. (4.3L) engines have a different firing configuration than the 200-229 cu.in. engines, and cannot use the 200-229 camshaft. The 1987-91 262 cu.in. (4.3L) engines are equipped with hydraulic roller

camshafts that use a different configuration camshaft core than the 85-86 engines and cannot be interchanged. These 1992-2002 (4.3L) engines incorporate a balance shaft and utilize a different camshaft core that cannot be interchanged with previous models.

**NOTE:** Mechanical roller camshafts and components are available on special order.

**NOTE:** Many Chevrolet 262-400 V-8 valve train components are applicable to the 90° V-6 engines. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362      | See pg. 360          | See pg. 306           | See pg. 328                    | See pg. 312             | See pg. 315   | See pg. 317  |
|--------------------------------|-----------------------|-------------|------------------|----------------------|-----------------------|--------------------------------|-------------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS | VALVE STEM LOCKS     | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS       | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 96802-12 <sup>b</sup> | 99915-12    |                  | 99097-1 <sup>d</sup> | 10621-12 <sup>e</sup> |                                | 11801-12 <sup>f,k</sup> | 11774-12 <sup>g,k</sup><br>11744-12 <sup>h,k</sup>  | 11750-12 <sup>i,k</sup><br>10751-12 <sup>i,k</sup> |
|                                | 96802-12 <sup>b</sup> | 99915-12    |                  | 99097-1 <sup>d</sup> | 10621-12 <sup>e</sup> |                                | 11801-12 <sup>f,k</sup> | 11774-12 <sup>g,k</sup><br>11744-12 <sup>h,k</sup>  | 11750-12 <sup>i,k</sup><br>10751-12 <sup>i,k</sup> |
|                                | 99838-12 <sup>c</sup> | 99944-12    |                  | 99097-1 <sup>d</sup> | 10621-12 <sup>e</sup> |                                | 11801-12 <sup>f,k</sup> | 11774-12 <sup>g,k</sup><br>11744-12 <sup>h,k</sup>  | 11750-12 <sup>i,k</sup><br>10751-12 <sup>i,k</sup> |
|                                | 99838-12 <sup>c</sup> | 99944-12    |                  | 99097-1 <sup>d</sup> | 10621-12 <sup>e</sup> |                                | 11801-12 <sup>f,k</sup> | 11774-12 <sup>g,k</sup><br>11744-12 <sup>h,k</sup>  | 11750-12 <sup>i,k</sup><br>10751-12 <sup>i,k</sup> |
|                                | 99838-12 <sup>c</sup> | 99944-12    |                  | 99097-1 <sup>d</sup> | 10621-12 <sup>e</sup> |                                | 11801-12 <sup>f,k</sup> | 11774-12 <sup>g,k</sup><br>11744-12 <sup>h,k</sup>  | 11750-12 <sup>i,k</sup><br>10751-12 <sup>i,k</sup> |

- a For use with standard GM alignment bars.
- b Standard diameter valve springs, no machining required.
- c Must machine cylinder heads.
- d Machined steel, heat treated.
- e Heat treated, heavy wall, for use with or without pushrod guideplate cylinder heads.
- f 1.5 ratio, 3/8" stud, extra long slot (not self-aligning).
- g Crane Classic extruded 1.5 ratio, 3/8" stud (not self-aligning).
- h Energizer 1.5 ratio, 3/8" stud (not self-aligning).
- i 1.5 ratio, 3/8" stud (not self-aligning).
- j 1.5 ratio, 3/8" stud, self-aligning, narrow body for center bolt valve covers.
- k Early 1992 engines are equipped with 3/8" stud self-aligning rocker arms. Late 1992 and later engines have 8mm stud self-aligning rocker arms. These engines can be converted to 3/8" studs by installing 6 of our **99148-2** rocker arm studs which have a 10mm bottom thread and a 3/8"-24 top thread (no machining is required). Appropriate pushrod guideplates must be installed if non self-aligning type rocker arms are used. If aluminum rocker arms are desired, only the narrow body configuration will fit if standard center bolt valve covers are being used.

# Chevrolet Small Block V8 Tech Tips & Notes

**1957-1987 262-400 V8 (262-265-267 (4.4L)-283-302-305 (5.0L)-307-327-350 (5.7L)-400 cu.in.)**

The classic Small Block Chevrolet V8 was introduced in 1955, in a 265 cu.in. version. The 1955-56 265 engines required a camshaft having a flat machined on the rear cam bearing journal to allow for oil flow to the lifter galleries and the top end. If you are using one of these blocks, a flat must be machined in center of the rear cam journal, .350" wide and .080" deep. Another option would be installing later model cam bearings in these early blocks. If your camshaft already has a flat on the rear journal, it will not cause any oiling problems if used in a later engine.

The entire family of engines, designated by Crane Cams' 11 prefix (except the Energizer line of camshafts), were equipped from the factory with flat faced lifters, either hydraulic or mechanical, throughout their production run. We offer complete lines of hydraulic, hydraulic roller, mechanical, and mechanical roller camshafts, lifters, and valve train components for these. Although we list this engine family as running through 1987, some truck applications continued through 1995. It's important to verify the engine type when dealing with these vehicles to insure the proper components are being obtained.

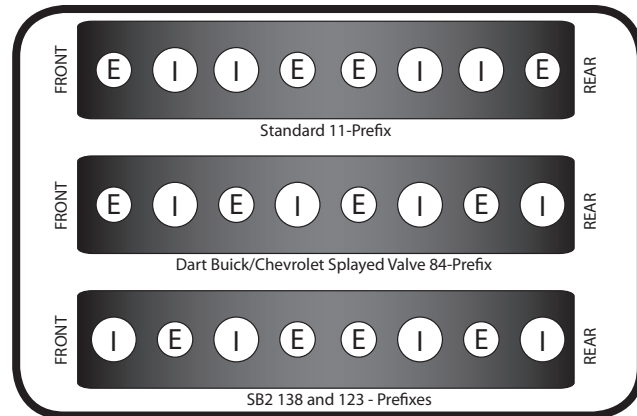
Cast hydraulic and mechanical lifter camshafts are available with standard cam bearing sizes, and also optional Chevrolet Big Block bearing sized journals (1.948" dia.), indicated by a BB suffix in the grind number. The standard firing order is 1-8-4-3-6-5-7-2, and cast standard journal camshafts can also be ordered with our SFO suffix firing order configuration of 1-8-7-3-6-5-4-2.

Crane Cams' retrofit hydraulic roller and mechanical roller camshafts are produced from steel billet material, heat treated, and finish ground in a variety of versions. Our retrofit hydraulic roller lifters do not require any block machining, and are a drop-in configuration, incorporating a vertical locking bar. For street and endurance applications, we offer camshafts equipped with a cast iron distributor drive gear and rear journal installed on the steel camshaft. These are noted by an IG suffix (Iron Gear), allowing the use of a standard type distributor gear for long term reliability.

There are many journal size options available for the roller camshafts, including: Standard (1.868"); Roller Bearing (1.875") – RB suffix; Big Block (1.948") – BB suffix; Large Roller Bearing (50mm/1.969") – LRB suffix; 55mm (2.165") –55J suffix. Other sizes are available on request. Camshafts with larger than stock journals have a step ground on the front journal, so a standard size camshaft sprocket can be used.

We offer camshafts with different lobe layouts for the various cylinder head options that can be installed on these engines. On this page are drawings illustrating the standard Small Block, Dart Buick/Chevrolet Splayed Valve (84 – prefix), and Chevrolet SB2 (138 – prefix) cylinder head valve layouts that are primarily in use today.

Standard, SFO (1-8-7-3-6-5-4-2), and SFO1 (1-8-7-2-6-5-4-3) firing orders are offered, along with other custom options



for 180 degree crankshafts and other unique situations.

Drilling and tapping the rear cam journal for the Sander accessory drive is offered (RD – suffix), as is gun drilling of the camshaft for lightness and reduced torsional deflection (DR – suffix). For certain usages, we offer special lightweight camshafts (LW – suffix) having undercut bearing journals, narrow lobes, and gun drilling where weight saving is of prime importance.

## **1987-1999 305 (5.0L)- 350 (5.7L) V8**

This first major upgrade to the traditional Small Block V8 incorporated a hydraulic roller camshaft and lifters. These are sometimes referred to as Vortec engines when checking some reference materials. The bolt pattern on the front of the camshaft was reduced in diameter, allowing for a step on the front journal, permitting the installation of a thrust-plate to control camshaft endplay.

This engine family is referred to as Crane Cams' 10-prefix, and our early steel billet camshaft cores did not incorporate provisions for the front ignition drive that was later used on the 1992-1997 LT-1 and LT-4 engines.

We have separated these engines from the LT-1 & LT-4 versions in this catalog to properly define the emissions liabilities of the camshafts, although they will now physically interchange. Since the late 90's, all of our camshafts for these powerplants have been machined for the front ignition drive and include the long cam dowel pin that's also needed. If you have an engine that does not require the long dowel pin, you can drive the pin in further to the proper length for your application.

The lifter bores on these blocks were increased in height to accommodate the hydraulic roller lifters. When using a camshaft with greater than standard lobe lift, or a small base circle cam, you must use taller-than-standard lifters to prevent them dropping out of the factory alignment bars when on the base circle. Our **10535-16** hydraulic roller lifters are intended for these purposes. Our vertical guidebar **11532-16** retrofit hydraulic roller lifters are also suitable for these applications.

We also offer mechanical roller lifter camshafts and components for these engines, in either standard or Iron Gear configurations.

**1992-1996 305 (5.0L)- 350 (5.7L)  
LT-1 & LT-4 V8**

Additional changes in 1992 resulted in the Gen II, or LT-series of engines. Reverse cooling, front mounted distributors, a different timing chain and gear set, and other improvements resulted in greater power potential and reliability. All of these were hydraulic roller camshaft and lifters equipped, incorporating the tall lifter bores. The Crane Cams 10-prefix is again used for these engines. On applications where higher than stock lift, or small base circle camshafts are used, our **10535-16** or **11532-16** hydraulic roller lifters should be used.

Mechanical roller lifter camshafts and components are offered, in standard or Iron Gear versions.

**1997-2010 4.8-5.3-5.7-6.0-6.2-7.0L  
LS-Series V8**

A clean sheet design for the Small Block, this new engine has virtually no interchangeability with the earlier engines. Crane Cams 144-prefix designates these camshafts and specific components. The camshaft has large 55mm (2.165") diameter journals, three bolts to attach the cam sprocket, and no distributor drive gear. Hydraulic roller camshafts and lifters are standard.

LS1 and LS6 engines have a camshaft position sensor split ring incorporated into the barrel of the cam, near the rear of the camshaft. LS2, LS3, LS7, and L92 engines have the camshaft position sensor incorporated into the camshaft sprocket. Our camshafts have the sensor split ring on the cam, and can be used in either version. The standard firing order is 1-8-7-2-6-5-4-3.

The LS3, LS7, and L92 engines are originally equipped with camshafts that have a single bolt to attach the cam sprocket. Our camshafts can be installed in these engines if the proper three bolt type cam sprocket is used.

Standard rocker arm ratio for these engines is 1.7:1, except the LS7, which comes equipped with 1.8:1 rockers.

Again, when using camshafts with greater than stock lobe lifts (or reduced base circle diameters), there can be a danger of the lifters dropping out of the alignment blocks. Crane Cams offers specific long travel lifters to prevent this occurrence, with our **144536-16** steel billet hydraulic roller lifters. Long travel mechanical roller lifters **144511-16** (that use the standard alignment blocks) are also available for those demanding the increased RPM capabilities of a mechanical roller camshaft (available on special order).

We're constantly adding to our product offerings for this family of engines, as its popularity continues to grow. Heavy wall pushrods, stud and shaft mounted rocker arms, valve springs, retainers, and steel billet valve locks provide performance and reliability improvements that you will find throughout this catalog.

**1996-2010 SB2 V8**

Designed specifically for racing applications, and never installed in any production vehicles, the SB2 engine has a unique cylinder block and cylinder heads. Although the SB2 heads have a different valve layout from other members of the Small Block family, they can also be installed on a conventional 262-400 type engine, provided many other changes are made, among these being the camshaft (use our 138-prefix camshafts for this application as noted earlier).

An SB2.2 block has staggered lifter bores, similar to the Big Block Chevys, straightening the pushrod angles for the canted valve SB2 series of cylinder heads. Our 123-prefix camshafts have been created expressly for these engines. Steel billet roller camshafts are offered with Large Roller Bearing (50mm/1.969") LRB – suffix, and 55mm (2.165") 55J –suffix options. As these are usually produced for specific racing applications, we custom grind them per order to insure the latest cam lobe design technologies are used.

Roller lifters are offered in standard .842", .875" and .904" diameter. Any of these are available with appropriate pushrod seat offsets as required by the cylinder head preparation that was performed.

**Contact Crane Cams directly for the latest product information on these engines.**

## COMPLETE CAM SPECIFICATIONS

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code  | See pg. 293<br>LIFTERS | Degrees             | Advertised          | Degrees            | Open/Close          | Lash        | Gross        |  |
|---|----------------------------------|-----------------------|---|------------------------|---------------------|---------------------|--------------------|---------------------|-------------|--------------|--|
|   |                                  |                       |   |                        | Duration<br>@ .050" | Degrees<br>Duration | Lobe<br>Separation | @ .050"<br>Cam Lift | Hot<br>Int. | Lift<br>Int. |  |
| <b>Hydraulic Lifter Camshafts</b>   |                                  |                       |   |                        |                     |                     |                    |                     |             |              |  |
| Brute low end torque, great for standard 267 and 305 engines. (50 state legal in 81-87 car and 81-92 truck 267-305 applications only. C.A.R.B. E.O. D-225-19)   | 2010                             | 500-<br>4000          | 114102 <sup>a,b</sup>                       | 99277-16               | 184                 | 244                 | 104                | (12) 16             | .000        | .378         |  |
|   |                                  |                       |   |                        | 194                 | 254                 | 21 (7)             | .000                | .401        |              |  |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised. (50 state legal, pre-computer, C.A.R.B. E.O. D-225-18)  | H-248-2                          | 800-<br>4600          | 113971<br>113972 <sup>b</sup>               | 99277-16               | 192                 | 248                 | 112                | (11) 23             | .000        | .400         |  |
|   |                                  |                       |   |                        | 204                 | 260                 | 39 (15)            | .000                | .427        |              |  |
| Great for 305 engines in cars, light and intermediate trucks with optional gearing. Good low and mid-range torque and HP. (50 state legal in 81-87 car applications only. C.A.R.B. E.O. D-225-19)   | 2020                             | 800-<br>4400          | 114112 <sup>a,b</sup>                       | 99277-16               | 194                 | 254                 | 104                | (7) 21              | .000        | .401         |  |
|   |                                  |                       |   |                        | 204                 | 264                 | 26 (2)             | .000                | .423        |              |  |
| Replacement for factory 300 HP 327 cu.in. camshaft.   | BluePrinted<br>3896929           | 800-<br>4500          | 968711                                      | 99277-16               | 195                 |                     | 112                | (10.5) 25.5         | .000        | .390         |  |
|   |                                  |                       |   |                        | 202                 |                     | 37 (15)            | .000                | .410        |              |  |
| Excellent low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 8.0 to 9.5 compression ratio advised. (50 state legal, pre-computer, C.A.R.B. E.O. D-225-21)  | Energizer<br>260 H10             | 1000-<br>4600         | 10003<br>100032 <sup>c</sup>                | 99277-16               | 204                 | 260                 | 110                | (3) 27              | .000        | .427         |  |
|   |                                  |                       |   |                        | 204                 | 260                 | 37 (13)            | .000                | .427        |              |  |
| Good mid-range and top-end performance in Monte Carlo SS, Camaro and Firebird with 305 HO, and 350 trucks. (50 state legal in 81-87 car and 81-92 truck 267-305 applications only. C.A.R.B. E.O. D-225-19)  | 2030                             | 1200-<br>4800         | 114122 <sup>a,b</sup>                       | 99277-16               | 204                 | 264                 | 110                | (8) 32              | .000        | .423         |  |
|   |                                  |                       |   |                        | 214                 | 274                 | 37 (3)             | .000                | .446        |              |  |
| Excellent low end torque and HP, smooth idle, daily usage, off road, towing, economy, also mild turbo-charged, marine applications: primarily used in 305 and 350 cu.in. near-stock engines for mild performance applications in heavy boats, OK for through-prop exhaust, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised. (50 state legal, pre-computer, C.A.R.B. E.O. D-225-18) | H-260-2                          | 1200-<br>5000         | 113901<br>113902 <sup>b</sup>               | 99277-16               | 204                 | 260                 | 112                | (5) 29              | .000        | .427         |  |
|   |                                  |                       |   |                        | 216                 | 272                 | 45 (9)             | .000                | .454        |              |  |
| Excellent low end torque and HP, smooth idle, daily usage, off road, towing, economy, also mild turbo-charged, marine applications: primarily used in 305 and 350 cu.in. near-stock engines for mild performance applications in heavy boats, OK for through-prop exhaust, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.  | Z-256-2                          | 1200-<br>5200         | 113501 <sup>a</sup><br>113502 <sup>tb</sup> | 99277-16               | 206                 | 256                 | 112                | (4) 30              | .000        | .432         |  |
|   |                                  |                       |   |                        | 218                 | 268                 | 46 (8)             | .000                | .459        |              |  |
| Good low end torque, smooth idle, daily usage, fuel economy, light towing, off road, 2200-2700 cruise RPM, 8.5 to 10.0 compression ratio advised. (50 state legal, pre-computer, C.A.R.B. E.O. D-225-21).   | Energizer<br>266 H10             | 1400-<br>5000         | 10004<br>100042 <sup>c</sup>                | 99277-16               | 210                 | 266                 | 110                | 0 30                | .000        | .440         |  |
|   |                                  |                       |   |                        | 210                 | 266                 | 40 (10)            | .000                | .440        |              |  |
| Great for 305 HO and performance 350 trucks, good mid and top end torque and HP, axle ratios of 3.73 or numerically higher required, auto or 5-speed manual, must use 99470-1 Adjustable Fuel Pressure Regulator. (50 state legal in 81-87 267-400, carb equipped cars only. C.A.R.B. E.O. D-225-25)  | 2040                             | 1600-<br>5400         | 114132 <sup>a,b</sup>                       | 99277-16               | 210                 | 270                 | 114                | (4) 34              | .000        | .440         |  |
|   |                                  |                       |   |                        | 216                 | 276                 | 47 (11)            | .000                | .454        |              |  |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Camshafts having standard size journals with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts for modified standard blocks, or Oldsmobile/Dart blocks, having Big Block Chevrolet size (1.948") cam bearings are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337             | See pg. 350           | See pg. 362      | See pg. 360          | See pg. 306           | See pg. 328                    | See pg. 312           | See pg. 315                                    | See pg. 317   |
|--------------------------------|-------------------------|-----------------------|------------------|----------------------|-----------------------|--------------------------------|-----------------------|--|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS           | RETAINERS             | VALVE STEM SEALS | VALVE STEM LOCKS     | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS     | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE   |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                  | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup> | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |

**Section Continued**

- a For 81-87 applications.
- b Cam and Lifter Kit, includes installation lubricants and Cam Sprocket bolt Locking Plate.
- c Cam and Lifter Kit, includes assembly lubricants.
- d Contains standard diameter valve springs, no machining required.
- e For 1967-87 with 1.700" assembly height.
- f Machined steel, heat treated.
- g Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.

- h Performance steel billet gears and roller chain set.
- i 1.5 ratio, 3/8" stud, long slot, (not self-aligning).
- j Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- k Energizer, 1.5 ratio, 3/8" stud (not self-aligning).
- l 1.5 ratio, 3/8" stud (not self-aligning).
- m 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.
- n 1.5 ratio, 3/8" stud, self-aligning narrow body for center bolt valve covers.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code                   | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |                 |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, good idle, daily usage, off road, towing, economy, marine applications: primarily used in 350 cu.in. mildly modified engines for mild performance applications in light boats, OK for through-prop exhaust, 2400-2800 cruise RPM, 8.5 to 10.0 compression ratio advised. (50 state legal, pre-computer, C.A.R.B. E.O. D-225-18)  | <b>H-266-2</b>                   | 1600-5200             | <b>113931</b><br><b>113932<sup>a</sup></b><br>◆1             | <b>99277-16</b> | 210<br>216                                 | 266<br>272                                    | 114                           | (4) 34<br>47 (11)                            | .000<br>.000                | .440<br>.454                  |
| Good low end and mid range torque and HP, good idle, daily usage, off road, towing, economy, marine applications: primarily used in 350 cu.in. mildly modified engines for mild performance applications in light boats, OK for through-prop exhaust, 2400-2800 cruise RPM, 8.5 to 10.0 compression ratio advised.   | <b>Z-262-2</b>                   | 1600-5400             | <b>113511<sup>*</sup></b><br><b>113512<sup>a</sup></b><br>◆3 | <b>99277-16</b> | 212<br>218                                 | 262<br>268                                    | 114                           | (3) 35<br>48 (10)                            | .000<br>.000                | .446<br>.459                  |
| Good low end and mid range torque, good idle, daily usage, off road, highway towing, fuel efficiency plus performance, 2600-3000 cruise RPM, 8.75 to 10.0 compression ratio state legal, pre-computer, C.A.R.B. E.O. D-225-21)   | <b>Energizer<br/>272 H10</b>     | 1600-5400             | <b>10005</b><br><b>100052<sup>b</sup></b><br>◆1              | <b>99277-16</b> | 216<br>216                                 | 272<br>272                                    | 110                           | 3 33<br>43 (7)                               | .000<br>.000                | .454<br>.454                  |
| Serious performance for 305 and 350 carb equipped cars w/aftermarket intake, performance cylinder heads and free flow exhaust, auto or manual trans or modified 305 w/5-speed, axle ratios 3.73 or numerically higher required. <b>11308-1</b> Spring and Retainer Kit required for maximum performance. (50 state legal in 81-87 267 thru 400 carb equipped cars only. C.A.R.B. E.O. D-225-25).   | <b>2050</b>                      | 1800-5600             | <b>114142<sup>a,c</sup></b><br>◆1                            | <b>99277-16</b> | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000                | .454<br>.480                  |
| Good low end and mid range torque and HP, good idle, daily usage and off road, towing, performance and fuel efficiency, marine applications: for 350+ cu.in. modified engines with free flowing above water exhaust systems for performance applications in light pleasure and ski boats, including jet boats, 2600-3000 cruise RPM, 8.75 to 10.75 compression ratio advised, good w/plate nitrous system. Good w/centrifugal or Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised. (50 state legal, pre-computer, C.A.R.B. E.O. D-225-18). | <b>H-272-2</b>                   | 1800-5600             | <b>113941</b><br><b>113942<sup>a</sup></b><br>◆1             | <b>99277-16</b> | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000                | .454<br>.480                  |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Camshafts having standard size journals with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts for modified standard blocks, or Oldsmobile/Dart blocks, having Big Block Chevrolet size (1.948") cam bearings are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>      | <i>See pg. 350</i>    | <i>See pg. 362</i> | <i>See pg. 360</i>   | <i>See pg. 306</i>    | <i>See pg. 328</i>             | <i>See pg. 312</i>    | <i>See pg. 315</i>                                  | <i>See pg. 317</i>  |
|--------------------------------|-------------------------|-----------------------|--------------------|----------------------|-----------------------|--------------------------------|-----------------------|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS           | RETAINERS             | VALVE STEM SEALS   | VALVE STEM LOCKS     | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS     | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                    | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup>      | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                    | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup>      | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                    | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup>      | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                    | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup>      | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup> | 99915-16 <sup>e</sup> |                    | 99097-1 <sup>f</sup> | 11621-16 <sup>g</sup> | 11975-1 <sup>h</sup>           | 11800-16 <sup>i</sup> | 11774-16 <sup>j</sup><br>11744-16 <sup>k</sup>      | 11750-16 <sup>l</sup><br>10750-16 <sup>m</sup><br>10751-16 <sup>n</sup> |






**Section Continued**

- a** Cam and Lifter Kit, includes installation lubricants and Cam Sprocket bolt Locking Plate.
- b** Cam and Lifter Kit, includes assembly lubricants.
- c** For 81-87 applications.
- d** Contains standard diameter valve springs, no machining required.
- e** For 1967-87 with 1.700" assembly height.
- f** Machined steel, heat treated.
- g** Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.

- h** Performance steel billet gears and roller chain set.
- i** 1.5 ratio, 3/8" stud, long slot, (not self-aligning).
- j** Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- k** Energizer, 1.5 ratio, 3/8" stud (not self-aligning).
- l** 1.5 ratio, 3/8" stud (not self-aligning).
- m** 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.
- n** 1.5 ratio, 3/8" stud, self-aligning narrow body for center bolt valve covers.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code  | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|---|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>   |                                  |                       |   |                 |  |   |                               |  |                             |                               |
| Good low and mid range torque, rough idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 2600-3000 cruise RPM, oval track; Street Stock, Enduro, Hobby, etc, 1/4-3/8 mile, 8.75 to 10.0 compression ratio advised.   | <b>Energizer<br/>274 H06</b>     | 1800-<br>5400         | 10017*  | <b>99277-16</b> | 218  | 274   | 106                           | 7 31   | .000                        | .450                          |
|   |                                  |                       | 100172 <sup>ab</sup>  |                 | 218  |   |                               | 39 (1)                                       |                             |                               |
|   |                                  |                       | 110172 <sup>c</sup>   |                 |  |   |                               |  |                             |                               |
|   |                                  |                       |    |                 |  |   |                               |  |                             |                               |
| Good idle, daily usage and off road, towing, performance and fuel efficiency, marine applications: for 350+ cu.in. modified engines with free flowing above water exhaust systems for performance applications in light pleasure and ski boats, including jet boats. 2600-3000 cruise RPM, 8.75 to 10.75 compression ratio advised, good w/plate nitrous system. Good w/centrifugal or small Roots super-charger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised. | <b>Z-268-2</b>                   | 1800-<br>5800         | 113521*   | <b>99277-16</b> | 218  | 268   | 112                           | 2 36   | .000                        | .459                          |
|   |                                  |                       | 113522 <sup>a</sup>   |                 | 230  |   |                               | 52 (2)                                       |                             |                               |
|   |                                  |                       |    |                 |  |   |                               |  |                             |                               |
| Good mid range torque, good to fair idle, daily performance usage, mild bracket racing, auto trans w/stock to 2500 converter, 2700-3200 cruise RPM, 9.5 to 10.75 compression ratio advised.   | <b>Energizer<br/>278 H10</b>     | 2000-<br>5800         | 10013   | <b>99277-16</b> | 222  | 278   | 110                           | 6 36   | .000                        | .467                          |
|   |                                  |                       | 100132 <sup>b</sup>   |                 | 222  |   |                               | 46 (4)                                       |                             |                               |
|   |                                  |                       |    |                 |  |   |                               |  |                             |                               |
| Replacement for factory 350 HP 327 cu.in. camshaft.   | <b>BluePrinted<br/>3863151</b>   | 2000-<br>5600         | 967601  | <b>99277-16</b> | 222  |   | 114                           | 1 41   | .000                        | .447                          |
|   |                                  |                       |   |                 | 222  |   |                               | 49 (7)                                       |                             |                               |
|   |                                  |                       |    |                 |  |   |                               |  |                             |                               |
| Performance usage, good upper RPM HP, 360+ cu.in., bracket racing; Pro ET, Super ET, etc., auto trans w/4000+ converter, 11.5 minimum compression ratio advised.  | <b>H-284</b>                     | 2200-<br>6000         | 114201  | <b>99277-16</b> | 222  | 284   | 114                           | 2 40   | .000                        | .450                          |
|   |                                  |                       |   |                 | 222  |   |                               | 50 (8)                                       |                             |                               |
|   |                                  |                       |  |                 |  |   |                               |  |                             |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Camshafts having standard size journals with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts for modified standard blocks, or Oldsmobile/Dart blocks, having Big Block Chevrolet size (1.948") cam bearings are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                    | See pg. 337   | See pg. 350                       | See pg. 362           | See pg. 360          | See pg. 306                                    | See pg. 328  | See pg. 312   | See pg. 315   | See pg. 317   |
|--|---|-----------------------------------|-----------------------|----------------------|--|--|---|---|---|
| VALVE SPRING AND RETAINER KITS                 | VALVE SPRINGS   | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS   | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
| 11309-1 <sup>g,h</sup><br>11310-1 <sup>i</sup> | 96802-16 <sup>j</sup><br>99846-16 <sup>h</sup><br>99838-16 <sup>i</sup> | 99915-16 <sup>f</sup><br>99944-16 | 99820-16 <sup>i</sup> | 99097-1 <sup>k</sup> | 11621-16 <sup>l</sup><br>11630-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801C-16 <sup>q</sup><br>10800C-16 <sup>r</sup>                          | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup>      | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11308-1 <sup>e,f</sup>                         | 99848-16 <sup>e,f</sup><br>96802-16 <sup>j</sup>                        | 99915-16 <sup>f</sup>             |                       | 99097-1 <sup>k</sup> | 11621-16 <sup>l</sup><br>11630-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>s</sup><br>11801C-16 <sup>q</sup><br>10800C-16 <sup>r</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup>      | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11308-1 <sup>e,f</sup>                         | 99848-16 <sup>e,f</sup><br>96802-16 <sup>j</sup>                        | 99915-16 <sup>f</sup>             |                       | 99097-1 <sup>k</sup> | 11621-16 <sup>l</sup><br>11630-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>s</sup><br>11801C-16 <sup>q</sup><br>10800C-16 <sup>r</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup>      | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11308-1 <sup>e,f</sup>                         | 99848-16 <sup>e,f</sup><br>96802-16 <sup>j</sup>                        | 99915-16 <sup>f</sup>             |                       | 99097-1 <sup>k</sup> | 11621-16 <sup>l</sup><br>11630-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>s</sup><br>11801C-16 <sup>q</sup><br>10800C-16 <sup>r</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup>      | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |

Section Continued

- a Cam and Lifter Kit, includes installation lubricants and Cam Sprocket bolt Locking Plate.
- b Cam and Lifter Kit, includes assembly lubricants.
- c Cam, lifter, and valve spring (99846-16) kit, includes installation lubricants.
- d Optional Hi Intensity Lifters, see page 292 for details.
- e Contains standard diameter valve springs, no machining required.
- f For 1967-87 with 1.700" assembly height.
- g Contains standard diameter valve springs and machined steel valve stem locks (99095-1), no machining required.
- h Standard diameter XHTCS tool steel valve springs for 1.800" assembly height.
- i Must machine cylinder heads.
- j Standard diameter chrome silicon valve springs for 1.750" assembly height.
- k Machined steel, heat treated.
- l Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- m Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- n Performance steel billet gears and roller chain set.

- o Pro Series steel billet gears and roller chain set.
- p Pro Series steel billet gears and roller chain set with thrust bearing.
- q 1.5 ratio, 3/8" stud, extra long slot, Nitro Carb (not self-aligning).
- r 1.5 ratio, 3/8" stud self-aligning, Nitro Carb.
- s 1.5 ratio, 3/8" stud, extra long slot (not self-aligning).
- t Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- u Energizer, 1.5 ratio, 3/8" stud (not self-aligning).
- v 1.5 ratio, 3/8" stud (not self-aligning).
- w 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.
- x 1.5 ratio, 3/8" stud, self-aligning narrow body for center bolt valve covers.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number                  | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|---|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>   |   |                       |  |                       |  |   |                               |  |                             |                               |
| Good mid range to upper RPM torque and HP, good idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.   | <b>H-278-2</b>                                    | 2200-<br>6200         | 113801*                                    | 99277-16              | 222  | 278   | 114                           | 2 40   | .000                        | .467                          |
|   |   |                       | 113802 <sup>a</sup>                        | 99377-16 <sup>d</sup> | 234  | 290   | 56 (2)                        | .000   | .494                        |                               |
| Good mid range to upper RPM torque and HP, fair idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.   | <b>Z-274-2</b>                                    | 2200-<br>6400         | 113531*                                    | 99277-16              | 224  | 274   | 110                           | 7 37   | .000                        | .473                          |
|   |   |                       | 113532 <sup>a</sup>                        | 99377-16 <sup>d</sup> | 230  | 280   | 50 0                          | .000   | .486                        |                               |
| Rough idle, moderate performance usage, good mid range to upper RPM HP, 3000-3400 cruise RPM, bracket racing; Street, Heavy, etc., auto trans w/3000+ converter, oval track; Street Stock, Enduro, Hobby, etc., 1/4-3/8 mile, serious off road, 9.5 to 11.0 compress. ratio advised.                      | <b>Energizer<br/>282 H06</b>                      | 2400-<br>6200         | 10008*                                     | 99277-16              | 226  | 282   | 106                           | 12 34  | .000                        | .470                          |
|   |   |                       | 100082 <sup>tb</sup>                       | 99377-16 <sup>d</sup> | 226  | 282   | 44 (2)                        | .000   | .470                        |                               |
|   |   |                       | 110082 <sup>tc</sup>                       |                       |  |   |                               |  |                             |                               |
| Good mid range HP, fair idle, moderate performance usage, w/plate or manifold nitrous system, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised. Good w/centrifugal or Roots supercharger, 10 lbs maximum boost w/8.0 maximum ratio advised. | <b>H-288-2</b>                                    | 2600-<br>6400         | 113821*                                    | 99277-16              | 226  | 288   | 114                           | 4 42   | .000                        | .458                          |
|   |   |                       | 113822 <sup>a</sup>                        | 99377-16 <sup>d</sup> | 234  | 296   | 56 (2)                        | .000   | .473                        |                               |
| Performance usage, good mid range torque and HP, bracket racing; Street, Heavy, etc., auto trans w/3000+ converter, 9.5 to 11.5 compression ratio advised.  | <b>H-228/320-6</b>                                | 2800-<br>6400         | 110551*                                    | 99277-16              | 228  | 284   | 106                           | 12 36  | .000                        | .480                          |
|   |   |                       |  | 99377-16 <sup>d</sup> | 228  | 284   | 44 4                          | .000   | .480                        |                               |
| Good mid range to upper RPM torque and HP, fair idle, moderate performance usage, good mid range HP, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised.   | <b>Energizer<br/>284 H12</b>                      | 2800-<br>6200         | 10007                                      | 99277-16              | 228  | 284   | 112                           | 7 41   | .000                        | .480                          |
|   |   |                       | 100072 <sup>b</sup>                        | 99377-16 <sup>d</sup> | 228  | 284   | 51 (3)                        | .000   | .480                        |                               |
| Good upper RPM torque and HP, fair idle, moderate performance usage, 3600-4000 cruise RPM, 10.0 to 11.5 compression ratio advised. Good w/centrifugal or Roots supercharger, 12 lbs. maximum boost w/8.0 maximum compression ratio advised.   | <b>H-228/3200-14</b>                              | 3000-<br>6400         | 110601*                                    | 99277-16              | 228  | 284   | 114                           | 5 43   | .000                        | .480                          |
|   |   |                       |  | 99377-16 <sup>d</sup> | 228  | 284   | 53 (5)                        | .000   | .480                        |                               |
| Oval track; .390/.410 lift rule classes, 2-bbl or 4-bbl, 1/4-3/8 mile, 9.0 to 10.5 compression ratio advised.   | <b>H-228/260-25-7</b>                             | 2800-<br>6000         | 110251*                                    | 99277-16              | 228  | 288   | 107                           | 11 37  | .000                        | .390                          |
|   |   |                       |  | 99377-16 <sup>d</sup> | 232  | 292   | 47 5                          | .000   | .410                        |                               |
| Performance usage, good mid range torque and HP, bracket racing; Street, Heavy, etc., auto trans w/3000+ converter, oval track; Street Stock, Enduro, Hobby, etc., 1/4-3/8 mile, 10.0 to 11.5 compression ratio advised.  | <b>Saturday Night Special<br/>H-228/3200-25-6</b> | 2800-<br>6400         | 110591*                                    | 99277-16              | 228  | 284   | 106                           | 12 36  | .000                        | .480                          |
|   |   |                       | 110592 <sup>tc</sup>                       | 99377-16 <sup>d</sup> | 234  | 290   | 47 7                          | .000   | .494                        |                               |
| Performance usage, good mid and upper RPM HP, bracket racing; Street, Heavy, etc., auto trans w/3000+ converter, oval track; Street Stock, Enduro, Hobby, etc., 1/4-3/8 mile, serious off road, 10.0 to 11.5 compression ratio advised.   | <b>Energizer<br/>286 H06</b>                      | 3000-<br>6400         | 10018*                                     | 99277-16              | 230  | 286   | 106                           | 13 37  | .000                        | .465                          |
|   |   |                       | 100182 <sup>b</sup>                        | 99377-16 <sup>d</sup> | 230  | 286   | 45 5                          | .000   | .465                        |                               |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Camshafts having standard size journals with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts for modified standard blocks, or Oldsmobile/Dart blocks, having Big Block Chevrolet size (1.948") cam bearings are available on special order. Contact Crane's Performance Consultants for details.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                   | See pg. 337   | See pg. 350  | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328  | See pg. 312   | See pg. 315                                    | See pg. 317  |
|---|---|--|-----------------------|--|--|--|---|--|--|
| VALVE SPRING AND RETAINER KITS                | VALVE SPRINGS   | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS   | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE  |
| 11308-1 <sup>ef</sup>                         | 99848-16 <sup>ef</sup><br>96802-16 <sup>j</sup>   | 99915-16 <sup>f</sup>                                      |                       | 99097-1 <sup>m</sup>                         | 11621-16 <sup>o</sup><br>11630-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> | 11801-16 <sup>s</sup><br>11801C-16 <sup>u</sup><br>10800C-16 <sup>v</sup> | 11774-16 <sup>w</sup><br>11744-16 <sup>x</sup> | 11750-16 <sup>y</sup><br>10750-16 <sup>z</sup><br>10751-16 <sup>aa</sup> |
| 11308-1 <sup>ef</sup>                         | 99848-16 <sup>ef</sup><br>96802-16 <sup>j</sup>   | 99915-16 <sup>f</sup>                                      |                       | 99097-1 <sup>m</sup>                         | 11621-16 <sup>o</sup><br>11630-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> | 11801-16 <sup>s</sup><br>11801C-16 <sup>u</sup><br>10800C-16 <sup>v</sup> | 11774-16 <sup>w</sup><br>11744-16 <sup>x</sup> | 11750-16 <sup>y</sup><br>10750-16 <sup>z</sup><br>10751-16 <sup>aa</sup> |
| 11309-1 <sup>gh</sup><br>11310-1 <sup>i</sup> | 96802-16 <sup>j</sup><br>99846-16 <sup>h</sup><br>99838-16 <sup>i</sup><br>96874-16 <sup>ik</sup> | 99915-16 <sup>f</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>i</sup> | 99097-1 <sup>m</sup><br>99094-1 <sup>n</sup> | 11621-16 <sup>o</sup><br>11630-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> | 11801C-16 <sup>u</sup><br>10800C-16 <sup>v</sup>                          | 11774-16 <sup>w</sup><br>11744-16 <sup>x</sup> | 11750-16 <sup>y</sup><br>10750-16 <sup>z</sup><br>10751-16 <sup>aa</sup> |
| 11308-1 <sup>ef</sup>                         | 99848-16 <sup>ef</sup><br>96802-16 <sup>j</sup>   | 99915-16 <sup>f</sup>                                      |                       | 99097-1 <sup>m</sup>                         | 11621-16 <sup>o</sup><br>11630-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> | 11801-16 <sup>s</sup><br>11801C-16 <sup>u</sup><br>10800C-16 <sup>v</sup> | 11774-16 <sup>w</sup><br>11744-16 <sup>x</sup> | 11750-16 <sup>y</sup><br>10750-16 <sup>z</sup><br>10751-16 <sup>aa</sup> |
| 11309-1 <sup>gh</sup><br>11310-1 <sup>i</sup> | 96802-16 <sup>j</sup><br>99846-16 <sup>h</sup><br>99838-16 <sup>i</sup><br>96874-16 <sup>ik</sup> | 99915-16 <sup>f</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>i</sup> | 99097-1 <sup>m</sup><br>99094-1 <sup>n</sup> | 11621-16 <sup>o</sup><br>11630-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> | 11801C-16 <sup>u</sup><br>10800C-16 <sup>v</sup>                          | 11774-16 <sup>w</sup><br>11744-16 <sup>x</sup> | 11750-16 <sup>y</sup><br>10750-16 <sup>z</sup><br>10751-16 <sup>aa</sup> |
| 11309-1 <sup>gh</sup><br>11310-1 <sup>i</sup> | 96802-16 <sup>j</sup><br>99846-16 <sup>h</sup><br>99838-16 <sup>i</sup><br>96874-16 <sup>ik</sup> | 99915-16 <sup>f</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>i</sup> | 99097-1 <sup>m</sup><br>99094-1 <sup>n</sup> | 11621-16 <sup>o</sup><br>11630-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> | 11801C-16 <sup>u</sup><br>10800C-16 <sup>v</sup>                          | 11774-16 <sup>w</sup><br>11744-16 <sup>x</sup> | 11750-16 <sup>y</sup><br>10750-16 <sup>z</sup><br>10751-16 <sup>aa</sup> |
| 11309-1 <sup>gh</sup><br>11310-1 <sup>i</sup> | 96802-16 <sup>j</sup><br>99846-16 <sup>h</sup><br>99838-16 <sup>i</sup><br>96874-16 <sup>ik</sup> | 99915-16 <sup>f</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>i</sup> | 99097-1 <sup>m</sup><br>99094-1 <sup>n</sup> | 11621-16 <sup>o</sup><br>11630-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> | 11801C-16 <sup>u</sup><br>10800C-16 <sup>v</sup>                          | 11774-16 <sup>w</sup><br>11744-16 <sup>x</sup> | 11750-16 <sup>y</sup><br>10750-16 <sup>z</sup><br>10751-16 <sup>aa</sup> |
| 11309-1 <sup>gh</sup><br>11310-1 <sup>i</sup> | 96802-16 <sup>j</sup><br>99846-16 <sup>h</sup><br>99838-16 <sup>i</sup><br>96874-16 <sup>ik</sup> | 99915-16 <sup>f</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>i</sup> | 99097-1 <sup>m</sup><br>99094-1 <sup>n</sup> | 11621-16 <sup>o</sup><br>11630-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> | 11801C-16 <sup>u</sup><br>10800C-16 <sup>v</sup>                          | 11774-16 <sup>w</sup><br>11744-16 <sup>x</sup> | 11750-16 <sup>y</sup><br>10750-16 <sup>z</sup><br>10751-16 <sup>aa</sup> |
| 11309-1 <sup>gh</sup><br>11310-1 <sup>i</sup> | 96802-16 <sup>j</sup><br>99846-16 <sup>h</sup><br>99838-16 <sup>i</sup><br>96874-16 <sup>ik</sup> | 99915-16 <sup>f</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>i</sup> | 99097-1 <sup>m</sup><br>99094-1 <sup>n</sup> | 11621-16 <sup>o</sup><br>11630-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> | 11801C-16 <sup>u</sup><br>10800C-16 <sup>v</sup>                          | 11774-16 <sup>w</sup><br>11744-16 <sup>x</sup> | 11750-16 <sup>y</sup><br>10750-16 <sup>z</sup><br>10751-16 <sup>aa</sup> |
| 11309-1 <sup>gh</sup><br>11310-1 <sup>i</sup> | 96802-16 <sup>j</sup><br>99846-16 <sup>h</sup><br>99838-16 <sup>i</sup><br>96874-16 <sup>ik</sup> | 99915-16 <sup>f</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>i</sup> | 99097-1 <sup>m</sup><br>99094-1 <sup>n</sup> | 11621-16 <sup>o</sup><br>11630-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> | 11801C-16 <sup>u</sup><br>10800C-16 <sup>v</sup>                          | 11774-16 <sup>w</sup><br>11744-16 <sup>x</sup> | 11750-16 <sup>y</sup><br>10750-16 <sup>z</sup><br>10751-16 <sup>aa</sup> |

**Section Continued**

- a Cam and Lifter Kit, includes installation lubricants and Cam Sprocket Bolt Locking Plate.
- b Cam and Lifter Kit, includes assembly lubricants.
- c Cam, lifter, and valve spring (99846-16) kit, includes installation lubricants. Contains standard diameter valve springs, no machining required.
- d Optional Hi Intensity Lifters, see page 292 for details.
- e Contains standard diameter valve springs, no machining required.
- f For 1967-87 with 1.700" assembly height.
- g Contains standard diameter valve springs and machined steel valve stem locks (99095-1), no machining required.
- h Standard diameter XHTCS tool steel valve springs for 1.800" assembly height.
- i Must machine cylinder heads.
- j Standard diameter chrome silicon valve springs for 1.750" assembly height.
- k Dual valve springs for +/- .100" length valves.
- l Requires Crane Multi Fit valve locks.
- m Machined steel, heat treated.
- n Machined steel, heat treated, Multi Fit.
- o Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- p Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- q Performance steel billet gears and roller chain set.
- r Pro Series steel billet gears and roller chain set.
- s Pro Series steel billet gears and roller chain set with thrust bearing.
- t 1.5 ratio, 3/8" stud, extra long slot (not self-aligning).
- u 1.5 ratio, 3/8" stud, extra long slot, Nitro Carb (not self-aligning).
- v 1.5 ratio, 3/8" stud, self-aligning, Nitro Carb.
- w Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- x Energizer, 1.5 ratio, 3/8" stud (not self-aligning).
- y 1.5 ratio, 3/8" stud (not self-aligning).
- z 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.
- aa 1.5 ratio, 3/8" stud, self-aligning narrow body for center bolt valve covers.

## COMPLETE CAM SPECIFICATIONS

| Application  | Camshaft Series/<br>Grind Number                        | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code   | See pg. 293<br>LIFTERS | Degrees                     | Advertised          | Degrees            | Open/Close          | Lash             | Gross             |
|--|---|-----------------------|--|------------------------|-----------------------------|---------------------|--------------------|---------------------|------------------|-------------------|
|  |   |                       |  |                        | Duration<br>@ .050"         | Degrees<br>Duration | Lobe<br>Separation | @ .050"<br>Cam Lift | Hot<br>Int. Exh. | Lift<br>Int. Exh. |
| Performance usage, good mid and upper RPM HP, fair idle, auto trans w/3000+ converter, 10.0 to 11.5 compression ratio advised.   | <b>H-230/318-12</b>                                     | 3000-6600             | <b>110501*</b>                               | <b>99277-16</b>        | 230                         | 290                 | 112                | 8 42                | .000             | .477              |
|  |   |                       |  |                        | <b>99377-16<sup>c</sup></b> | 230                 | 290                | 52 (2)              | .000             | .477              |
| Oval track; .390/.410 lift rule classes, 2-bbl or 4-bbl, 1/4-3/8 mile, 10.0 to 11.0 compression ratio advised.   | <b>H-232/260-2S1-6</b>                                  | 3000-6400             | <b>110271*</b>                               | <b>99277-16</b>        | 232                         | 292                 | 106                | 14 38               | .000             | .390              |
|  |   |                       |  |                        | <b>99377-16<sup>c</sup></b> | 236                 | 296                | 48 8                | .000             | .410              |
| Oval track; .410 lift rule classes, 2-bbl or 4-bbl, 1/4-3/8 mile, 10.0 to 11.0 compression ratio advised.  | <b>H-232/2732-6</b>                                     | 3000-6400             | <b>110301*</b>                               | <b>99277-16</b>        | 232                         | 290                 | 106                | 14 38               | .000             | .410              |
|  |   |                       |  |                        | <b>99377-16<sup>c</sup></b> | 232                 | 290                | 46 6                | .000             | .410              |
| Fair idle, performance usage, good mid range HP, 3800-4200 cruise RPM, 10.25 to 12.0 compression ratio advised.  | <b>H-296-2</b>  | 3000-6600             | <b>114561*</b>                               | <b>99277-16</b>        | 234                         | 296                 | 110                | 12 42               | .000             | .473              |
|  |   |                       |  |                        | <b>99377-16<sup>c</sup></b> | 242                 | 304                | 56 6                | .000             | .488              |
| Oval track; .390/.410 lift rule classes, 3/8-1/2 mile, 10.0 to 11.0 compression ratio advised.   | <b>H-236/260-2S1-6</b>                                  | 3200-6600             | <b>110291*</b>                               | <b>99277-16</b>        | 236                         | 296                 | 106                | 16 40               | .000             | .390              |
|  |   |                       |  |                        | <b>99377-16<sup>c</sup></b> | 242                 | 302                | 51 11               | .000             | .410              |
| Fair idle, performance usage, good mid range HP, 3800-4200 cruise RPM, 10.25 to 12.0 compression ratio advised.  | <b>Z-286-2</b>  | 3000-6800             | <b>113541*</b><br><b>113542<sup>a</sup></b>  | <b>99277-16</b>        | 236                         | 286                 | 110                | 13 43               | .000             | .491              |
|  |   |                       |  |                        | <b>99377-16<sup>c</sup></b> | 244                 | 294                | 57 7                | .000             | .497              |
| Performance usage, good mid and upper RPM torque, bracket racing; Street, Heavy, Pro ET, Super ET, etc., auto trans w/3500+ converter, oval track; Street Stock, Enduro, Hobby, etc., 1/4-3/8 mile, 10.5 to 12.0 compression ratio advised.  | <b>H-238/3347-6</b>                                     | 3200-6600             | <b>110651*</b>                               | <b>99277-16</b>        | 238                         | 294                 | 106                | 17 41               | .000             | .502              |
|  |   |                       |  |                        | <b>99377-16<sup>c</sup></b> | 238                 | 294                | 49 9                | .000             | .502              |
| Rough idle, performance usage, good mid and upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, 4200-4600 cruise RPM, 10.5 to 12.0 compression ratio advised.   | <b>H-238/3347-2S2-10</b>                                | 3200-6800             | <b>110521*</b>                               | <b>99277-16</b>        | 238                         | 294                 | 110                | 14 44               | .000             | .502              |
|  |   |                       |  |                        | <b>99377-16<sup>c</sup></b> | 242                 | 304                | 56 6                | .000             | .520              |
| Performance usage, good mid and upper RPM torque and HP, bracket racing; Street, Heavy, Pro ET, Super ET, etc., auto trans w/3500+ converter, oval track; Street Stock, Enduro, Hobby, etc., 1/4-3/8 mile, 10.5 to 12.0 compression ratio advised.   | <b>Saturday Night Special</b><br><b>H-238/3347-2S-6</b> | 3200-6800             | <b>110691*</b><br><b>110692<sup>tb</sup></b> | <b>99277-16</b>        | 238                         | 294                 | 106                | 17 41               | .000             | .502              |
|  |   |                       |  |                        | <b>99377-16<sup>c</sup></b> | 244                 | 300                | 52 12               | .000             | .516              |
| Rough idle, performance usage, w/manifold nitrous system, good mid and upper RPM HP, bracket racing, auto trans w/3500+ converter, 4200-4600 cruise RPM, 10.5 to 12.0 compression ratio advised. Good w/Roots supercharger, 15 lbs. maximum boost w/8.0 maximum compression ratio advised. | <b>H-300-2</b>  | 3200-7000             | <b>114051*</b>                               | <b>99277-16</b>        | 238                         | 300                 | 112                | 12 46               | .000             | .480              |
|  |   |                       |  |                        | <b>99377-16<sup>c</sup></b> | 246                 | 308                | 60 6                | .000             | .495              |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

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**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Camshafts having standard size journals with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) are available on special order. Contact Crane's Performance Consultants for details.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                    | See pg. 337  | See pg. 350  | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328  | See pg. 312                                      | See pg. 315                                    | See pg. 317   |
|--|--|--|-----------------------|--|--|--|--|--|---|
| VALVE SPRING AND RETAINER KITS                 | VALVE SPRINGS  | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS                                | — ALUMINUM CRANE CLASSIC/ENERGIZER             | ROCKERS — GOLD RACE   |
| 11309-1 <sup>d,e</sup><br>11310-1 <sup>f</sup> | 96802-16 <sup>g</sup><br>99846-16 <sup>e</sup><br>99838-16 <sup>f</sup><br>96874-16 <sup>h</sup> | 99915-16 <sup>i</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup> | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11309-1 <sup>d,e</sup><br>11310-1 <sup>f</sup> | 96802-16 <sup>g</sup><br>99846-16 <sup>e</sup><br>99838-16 <sup>f</sup><br>96874-16 <sup>h</sup> | 99915-16 <sup>i</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup> | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11309-1 <sup>d,e</sup><br>11310-1 <sup>f</sup> | 96802-16 <sup>g</sup><br>99846-16 <sup>e</sup><br>99838-16 <sup>f</sup><br>96874-16 <sup>h</sup> | 99915-16 <sup>i</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup> | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11310-1 <sup>f</sup>                           | 99838-16 <sup>f</sup><br>96874-16 <sup>h</sup>   | 99944-16<br>99969-16 <sup>j</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup> | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11309-1 <sup>d,e</sup><br>11310-1 <sup>f</sup> | 96802-16 <sup>g</sup><br>99846-16 <sup>e</sup><br>99838-16 <sup>f</sup><br>96874-16 <sup>h</sup> | 99915-16 <sup>i</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup> | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11310-1 <sup>f</sup>                           | 99838-16 <sup>f</sup><br>96874-16 <sup>h</sup>   | 99944-16<br>99969-16 <sup>j</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup> | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11309-1 <sup>d,e</sup><br>11310-1 <sup>f</sup> | 96802-16 <sup>g</sup><br>99846-16 <sup>e</sup><br>99838-16 <sup>f</sup><br>96874-16 <sup>h</sup> | 99915-16 <sup>i</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup> | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11309-1 <sup>d,e</sup><br>11310-1 <sup>f</sup> | 96802-16 <sup>g</sup><br>99846-16 <sup>e</sup><br>99838-16 <sup>f</sup><br>96874-16 <sup>h</sup> | 99915-16 <sup>i</sup><br>99944-16<br>99969-16 <sup>j</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup> | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11310-1 <sup>f</sup>                           | 99838-16 <sup>f</sup><br>96874-16 <sup>h</sup>   | 99944-16<br>99969-16 <sup>j</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup> | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |

**Section Continued**

- a Cam and Lifter Kit, includes installation lubricants and Cam Sprocket Bolt Locking Plate.
- b Cam, lifter, and valve spring (99846-16) kit, includes installation lubricants. Contains standard diameter valve springs, no machining required.
- c Optional Hi Intensity Lifters, see page 292 for details.
- d Contains standard diameter valve springs and machined steel valve stem locks (99095-1), no machining required.
- e Standard diameter XHTCS tool steel valve springs for 1.800" assembly height.
- f Must machine cylinder heads.
- g Standard diameter chrome silicon valve springs for 1.750" assembly height.
- h Dual valve springs for +.100" length valves.
- i For standard diameter valve springs, no machining required.
- j Requires Crane Multi Fit valve locks.
- k Machined steel, heat treated.
- l Machined steel, heat treated, Multi Fit.
- m Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- n Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- o Performance steel billet gears and roller chain set.
- p Pro Series steel billet gears and roller chain set.
- q Pro Series steel billet gears and roller chain set with thrust bearing.
- r 1.5 ratio, 3/8" stud, extra long slot, Nitro Carb (not self-aligning).
- s 1.5 ratio, 3/8" stud, self-aligning, Nitro Carb.
- t Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- u Energizer, 1.5 ratio, 3/8" stud (not self-aligning).
- v 1.5 ratio, 3/8" stud (not self-aligning).
- w 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.
- x 1.5 ratio, 3/8" stud, self-aligning narrow body for center bolt valve covers.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number                  | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code                              | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|---|-----------------------|---|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |   |                       |   |                 |  |   |                               |  |                             |                               |
| Performance usage, good mid to upper RPM torque, bracket racing; Heavy, Pro ET, Super ET, etc., auto trans w/3500+ converter, oval track; Street Stock, Enduro, Hobby, etc., 3/8-1/2 mile, 10.5 to 12.0 compression ratio advised.                                 | <b>H-244/3439-6</b>                               | 3200-6800             | <b>110711*</b>  | <b>99277-16</b> | 244  | 300   | 106                           | 20 44  | .000                        | .516                          |
|  |   |                       |   |                 | <b>99377-16<sup>c</sup></b>                | 244   | 300                           | 52 12  | .000                        | .516                          |
| Performance usage, good upper RPM torque and HP, bracket racing; Heavy, Pro ET, Super ET, etc., auto trans w/3500+ converter, 10.5 to 12.0 compression ratio advised.  | <b>Saturday Night Special<br/>H-244/3439-2S-6</b> | 3400-7000             | <b>110741*</b><br><b>110742<sup>a</sup></b>                             | <b>99277-16</b> | 244  | 300   | 106                           | 20 44  | .000                        | .516                          |
|  |   |                       |   |                 | <b>99377-16<sup>c</sup></b>                | 252   | 308                           | 56 16  | .000                        | .525                          |
| Performance usage, good upper RPM torque and HP, bracket racing; Heavy, Pro ET, Super ET, etc., auto trans w/3500+ converter, oval track; Street Stock, Enduro, Hobby, etc., 3/8-1/2 mile, 10.5 to 12.0 compression ratio advised.                                 | <b>Energizer<br/>302 H06</b>                      | 3400-7000             | <b>10011*</b><br><b>100112<sup>b</sup></b><br><b>110112<sup>a</sup></b> | <b>99277-16</b> | 246  | 302   | 106                           | 21 45  | .000                        | .500                          |
|  |   |                       |   |                 | <b>99377-16<sup>c</sup></b>                | 246   | 302                           | 53 13  | .000                        | .500                          |
| Rough idle, performance usage, good w/manifold nitrous system, good upper RPM HP, bracket racing, auto trans w/3500+ converter, 11.25 to 13.0 compression ratio advised. Good w/Roots supercharger, 18 lbs. maximum boost w/8.0 maximum compression ratio advised. | <b>H-308-2</b>                                    | 3400-7200             | <b>114571*</b>  | <b>99277-16</b> | 246  | 308   | 112                           | 16 50  | .000                        | .495                          |
|  |   |                       |   |                 | <b>99377-16<sup>c</sup></b>                | 254   | 316                           | 64 10  | .000                        | .510                          |
| Competition only, good upper RPM HP, 360+ cu.in., bracket racing w/light car; Pro ET, Super ET, etc., auto trans w/4000+ converter, 12.0 minimum compression ratio advised.  | <b>H-252/3500-12</b>                              | 3600-7200             | <b>110541*</b>  | <b>99277-16</b> | 252  | 308   | 112                           | 19 53  | .000                        | .525                          |
|  |   |                       |   |                 | <b>99377-16<sup>c</sup></b>                | 252   | 308                           | 63 9   | .000                        | .525                          |
| Competition only, NHRA Stock Eliminator 255 HP 350 cu.in.  | <b>654-655-08 T2 0A</b>                           | 4200-7200             | <b>110311*</b>  | <b>99277-16</b> | 252  | 286   | 108                           | 18 54  | .000                        | .390                          |
|  |   |                       |   |                 | <b>99377-16<sup>c</sup></b>                | 272   | 306                           | 64 28  | .000                        | .410                          |
| Competition only, good upper RPM HP, 360+ cu.in., bracket racing; Pro ET, Super ET, etc., auto trans w/4000+ converter, 11.5 minimum compression ratio advised.  | <b>H-256/3500-8</b>                               | 3800-7200             | <b>114581*</b>  | <b>99277-16</b> | 256  | 312   | 108                           | 25 51  | .000                        | .525                          |
|  |   |                       |   |                 | <b>99377-16<sup>c</sup></b>                | 256   | 312                           | 61 15  | .000                        | .525                          |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Camshafts having standard size journals with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts for modified standard blocks, or Oldsmobile/Dart blocks, having Big Block Chevrolet size (1.948") cam bearings are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                    | See pg. 337  | See pg. 350  | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328  | See pg. 312                                      | See pg. 315   | See pg. 317   |
|--|--|--|-----------------------|--|--|--|--|---|---|
| VALVE SPRING AND RETAINER KITS                 | VALVE SPRINGS  | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS                                | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
| 11310-1 <sup>d</sup>                           | 99838-16 <sup>d</sup><br>96874-16 <sup>g</sup>   | 99944-16<br>99969-16 <sup>i</sup>                          | 99820-16 <sup>d</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup>      | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11309-1 <sup>e,f</sup><br>11310-1 <sup>d</sup> | 96802-16 <sup>h</sup><br>99846-16 <sup>f</sup><br>99838-16 <sup>d</sup><br>96874-16 <sup>g</sup> | 99915-16 <sup>j</sup><br>99944-16<br>99969-16 <sup>i</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup>      | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11309-1 <sup>e,f</sup><br>11310-1 <sup>d</sup> | 96802-16 <sup>h</sup><br>99846-16 <sup>f</sup><br>99838-16 <sup>d</sup><br>96874-16 <sup>g</sup> | 99915-16 <sup>j</sup><br>99944-16<br>99969-16 <sup>i</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup>      | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11310-1 <sup>d</sup>                           | 99838-16 <sup>d</sup><br>96874-16 <sup>g</sup>   | 99944-16<br>99969-16 <sup>i</sup>                          | 99820-16 <sup>d</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup>      | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11310-1 <sup>d</sup>                           | 99838-16 <sup>d</sup><br>96874-16 <sup>g</sup>   | 99944-16<br>99969-16 <sup>i</sup>                          | 99820-16 <sup>d</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup>      | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |
| 11309-1 <sup>e,f</sup>                         | 99846-16 <sup>f</sup>  | 99915-16 <sup>j</sup>                                      |                       | 99097-1 <sup>k</sup>                         | 11630-16 <sup>n</sup>                          | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> |   |   |
| 11310-1 <sup>d</sup>                           | 99838-16 <sup>d</sup><br>96874-16 <sup>g</sup>   | 99944-16<br>99969-16 <sup>i</sup>                          | 99820-16 <sup>d</sup> | 99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 11621-16 <sup>m</sup><br>11630-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> | 11801C-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t</sup><br>11744-16 <sup>u</sup>      | 11750-16 <sup>v</sup><br>10750-16 <sup>w</sup><br>10751-16 <sup>x</sup> |

- a Cam, lifter, and valve spring (99846-16) kit, includes installation lubricants. Contains standard diameter valve springs, no machining required.
- b Cam and Lifter Kit, includes assembly lubricants.
- c Optional Hi Intensity Lifters, see page 292 for details.
- d Must machine cylinder heads.
- e Contains standard diameter valve springs and machined steel valve stem locks (99095-1), no machining required.
- f Standard diameter XHTCS tool steel valve springs for 1.800" assembly height.
- g Dual valve springs for +/- .100" length valves.
- h Standard diameter chrome silicon valve springs for 1.750" assembly height.
- i Requires Crane Multi Fit valve locks.
- j For standard diameter valve springs, no machining required.
- k Machined steel, heat treated.

- l Machined steel, heat treated, Multi Fit.
- m Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- n Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- o Performance steel billet gears and roller chain set.
- p Pro Series steel billet gears and roller chain set.
- q Pro Series steel billet gears and roller chain set with thrust bearing.
- r 1.5 ratio, 3/8" stud, extra long slot, Nitro Carb (not self-aligning).
- s 1.5 ratio, 3/8" stud, self-aligning, Nitro Carb.
- t Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- u Energizer, 1.5 ratio, 3/8" stud (not self-aligning).
- v 1.5 ratio, 3/8" stud (not self-aligning).
- w 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.
- x 1.5 ratio, 3/8" stud, self-aligning narrow body for center bolt valve covers.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                     | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts — Retrofit</b>   |                                  |                       |  |                             |  |   |                               |  |                             |                               |
| Brute low end torque and HP, smooth idle, daily usage, towing, economy, also mild turbocharged, 2200-3000 cruise RPM, 8.0 to 9.5 compression ratio advised.  | <b>HR-260-2-12 IG</b>            | 1000-5200             | <b>119811<sup>a</sup></b>                  | <b>11532-16<sup>b</sup></b> | 204<br>214                                 | 260<br>270                                    | 112                           | (5) 29<br>44 (10)                            | .000<br>.000                | .429<br>.452                  |
| Excellent low end and mid range torque and HP, good idle, daily usage, off road, performance and fuel efficiency, 2400-3200 cruise RPM, 8.75 to 10.5 compression ratio advised. Good w/small centrifugal or Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised, .900" base circle for long stroke clearance.   | <b>HR-210/325-2S-12.90 IG</b>    | 1400-5600             | <b>119561<sup>a</sup></b>                  | <b>11532-16<sup>b</sup></b> | 210<br>218                                 | 272<br>280                                    | 112                           | (2) 32<br>46 (8)                             | .000<br>.000                | .488<br>.509                  |
| Excellent low end and mid range torque and HP, good idle, daily usage, off road, performance and fuel efficiency, 2600-3400 cruise RPM, good w/small plate nitrous system, 8.75 to 10.5 compression ratio advised. Good w/centrifugal or small Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised.   | <b>HR-276-2S-12 IG</b>           | 1600-5800             | <b>119821<sup>a</sup></b>                  | <b>11532-16<sup>b</sup></b> | 214<br>222                                 | 276<br>284                                    | 112                           | 0 34<br>48 (6)                               | .000<br>.000                | .488<br>.509                  |
| Excellent low end and mid range torque and HP, good idle, daily usage, off road, performance and fuel efficiency, 2600-3400 cruise RPM, good w/small plate nitrous system, 8.75 to 10.5 compression ratio advised. Good w/centrifugal or small Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised, .900" base circle for long stroke clearance.        | <b>HR-216/339-2S-12.90 IG</b>    | 1600-5800             | <b>119671<sup>a</sup></b>                  | <b>11532-16<sup>b</sup></b> | 216<br>224                                 | 284<br>292                                    | 112                           | 1 35<br>49 (5)                               | .000<br>.000                | .509<br>.528                  |
| Good mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, good w/plate or manifold nitrous system, 3000-3800 cruise RPM, 9.5 to 10.75 compression ratio advised. Good w/centrifugal or Roots supercharger, 10 lbs. max. boost w/8.0 max. compression ratio advised.  | <b>HR-284-2S-12 IG</b>           | 2000-6200             | <b>119831<sup>a</sup></b>                  | <b>11532-16<sup>b</sup></b> | 222<br>230                                 | 284<br>292                                    | 112                           | 4 38<br>52 (2)                               | .000<br>.000                | .509<br>.528                  |
| Good mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, good w/plate or manifold nitrous system, 3000-3800 cruise RPM, 9.5 to 10.75 compression ratio advised. Good w/centrifugal or Roots supercharger, 10 lbs. maximum boost w/8.0 maximum compression ratio advised, .900" base circle for long stroke clearance. | <b>HR-222/345-2S-12.90 IG</b>    | 2000-6200             | <b>119701<sup>a</sup></b>                  | <b>11532-16<sup>b</sup></b> | 222<br>230                                 | 288<br>296                                    | 112                           | 4 38<br>52 (2)                               | .000<br>.000                | .518<br>.539                  |
| Good mid range torque and HP, fair idle, moderate performance usage, serious off road, mild bracket racing w/heavy car, auto trans w/2500+ converter, 3000-3800 cruise RPM, 9.5 to 10.75 compression ratio advised.  | <b>HR-230/352-2S1-8 IG</b>       | 2400-6400             | <b>119571<sup>a</sup></b>                  | <b>11532-16<sup>b</sup></b> | 230<br>238                                 | 292<br>300                                    | 108                           | 12 38<br>52 6                                | .000<br>.000                | .528<br>.548                  |
| Good mid range torque and HP, fair idle, performance usage, 3600-4400 cruise RPM, good with manifold nitrous system, 10.0 to 11.5 compression ratio advised. Good w/Roots supercharger, 15 lbs. maximum boost w/8.0 maximum compression ratio advised, .900" base circle for long stroke clearance.  | <b>HR-230/359-2S-12.90 IG</b>    | 2600-6600             | <b>119661<sup>a</sup></b>                  | <b>11532-16<sup>b</sup></b> | 230<br>238                                 | 292<br>300                                    | 112                           | 8 42<br>56 2                                 | .000<br>.000                | .539<br>.558                  |
| Good mid range torque and HP, fair idle, performance usage, mild bracket racing, auto trans w/3000+ converter, 3800-4600 cruise RPM, good with manifold nitrous system, 10.0 to 11.5 compression ratio advised. Good w/Roots supercharger, 15 lbs. maximum boost, w/8.0 maximum compression ratio advised.   | <b>HR-296-2S-12 IG</b>           | 2800-6800             | <b>119841<sup>a</sup></b>                  | <b>11532-16<sup>b</sup></b> | 234<br>242                                 | 296<br>304                                    | 112                           | 10 44<br>58 4                                | .000<br>.000                | .539<br>.558                  |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability, and to insure that correct components are used, the appropriate CamPonent Kit is recommended. Each Crane CamPonent Kit contains the valve train components needed for maximum performance.

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**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** When using 55-56, 265 cu.in. blocks, late model cam bearings must be installed.

**NOTE:** Camshafts having standard size journals with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts for modified standard blocks, or Oldsmobile/Dart blocks, having Big Block Chevrolet size (1.948") cam bearings are available on special order. Contact Crane's Performance Consultants for details.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337  | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328  | See pg. 312   | See pg. 315                                    | See pg. 317   |
|--------------------------------|--|-----------------------------------|-----------------------|--|--|--|---|--|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS  | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS   | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE   |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96802-16 <sup>e</sup><br>144846-16 <sup>x</sup>   | 99944-16<br>99915-16 <sup>g</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup>                         | 11628-16 <sup>k</sup><br>95621-16 <sup>l</sup> | 11975-1 <sup>m</sup><br>11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> | 11801-16 <sup>p</sup><br>11801C-16 <sup>q</sup><br>10800C-16 <sup>r</sup> | 11774-16 <sup>s</sup><br>11744-16 <sup>t</sup> | 11750-16 <sup>u</sup><br>10750-16 <sup>v</sup><br>10751-16 <sup>w</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96802-16 <sup>e</sup><br>144846-16 <sup>x</sup>   | 99944-16<br>99915-16 <sup>g</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup>                         | 11628-16 <sup>k</sup><br>95621-16 <sup>l</sup> | 11975-1 <sup>m</sup><br>11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> | 11801-16 <sup>p</sup><br>11801C-16 <sup>q</sup><br>10800C-16 <sup>r</sup> | 11774-16 <sup>s</sup><br>11744-16 <sup>t</sup> | 11750-16 <sup>u</sup><br>10750-16 <sup>v</sup><br>10751-16 <sup>w</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96802-16 <sup>e</sup><br>144846-16 <sup>x</sup>   | 99944-16<br>99915-16 <sup>g</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup>                         | 11628-16 <sup>k</sup><br>95621-16 <sup>l</sup> | 11975-1 <sup>m</sup><br>11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> | 11801-16 <sup>p</sup><br>11801C-16 <sup>q</sup><br>10800C-16 <sup>r</sup> | 11774-16 <sup>s</sup><br>11744-16 <sup>t</sup> | 11750-16 <sup>u</sup><br>10750-16 <sup>v</sup><br>10751-16 <sup>w</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96802-16 <sup>e</sup><br>144846-16 <sup>x</sup>   | 99944-16<br>99915-16 <sup>g</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup>                         | 11628-16 <sup>k</sup><br>95621-16 <sup>l</sup> | 11975-1 <sup>m</sup><br>11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> | 11801-16 <sup>p</sup><br>11801C-16 <sup>q</sup><br>10800C-16 <sup>r</sup> | 11774-16 <sup>s</sup><br>11744-16 <sup>t</sup> | 11750-16 <sup>u</sup><br>10750-16 <sup>v</sup><br>10751-16 <sup>w</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,f</sup><br>144846-16 <sup>x</sup> | 99944-16<br>99969-16 <sup>h</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99088-1 <sup>j</sup> | 11628-16 <sup>k</sup><br>95621-16 <sup>l</sup> | 11975-1 <sup>m</sup><br>11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> | 11801-16 <sup>p</sup><br>11801C-16 <sup>q</sup>                           | 11774-16 <sup>s</sup><br>11744-16 <sup>t</sup> | 11750-16 <sup>u</sup><br>10750-16 <sup>v</sup><br>10751-16 <sup>w</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,f</sup><br>144846-16 <sup>x</sup> | 99944-16<br>99969-16 <sup>h</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99088-1 <sup>j</sup> | 11628-16 <sup>k</sup><br>95621-16 <sup>l</sup> | 11975-1 <sup>m</sup><br>11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> | 11801-16 <sup>p</sup><br>11801C-16 <sup>q</sup>                           | 11774-16 <sup>s</sup><br>11744-16 <sup>t</sup> | 11750-16 <sup>u</sup><br>10750-16 <sup>v</sup><br>10751-16 <sup>w</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,f</sup><br>144846-16 <sup>x</sup> | 99944-16<br>99969-16 <sup>h</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99088-1 <sup>j</sup> | 11628-16 <sup>k</sup><br>95621-16 <sup>l</sup> | 11975-1 <sup>m</sup><br>11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> | 11801-16 <sup>p</sup><br>11801C-16 <sup>q</sup>                           | 11774-16 <sup>s</sup><br>11744-16 <sup>t</sup> | 11750-16 <sup>u</sup><br>10750-16 <sup>v</sup><br>10751-16 <sup>w</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,f</sup><br>144846-16 <sup>x</sup> | 99944-16<br>99969-16 <sup>h</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99088-1 <sup>j</sup> | 11628-16 <sup>k</sup><br>95621-16 <sup>l</sup> | 11975-1 <sup>m</sup><br>11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> | 11801-16 <sup>p</sup><br>11801C-16 <sup>q</sup>                           | 11774-16 <sup>s</sup><br>11744-16 <sup>t</sup> | 11750-16 <sup>u</sup><br>10750-16 <sup>v</sup><br>10751-16 <sup>w</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,f</sup><br>144846-16 <sup>x</sup> | 99944-16<br>99969-16 <sup>h</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99088-1 <sup>j</sup> | 11628-16 <sup>k</sup><br>95621-16 <sup>l</sup> | 11975-1 <sup>m</sup><br>11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> | 11801-16 <sup>p</sup><br>11801C-16 <sup>q</sup>                           | 11774-16 <sup>s</sup><br>11744-16 <sup>t</sup> | 11750-16 <sup>u</sup><br>10750-16 <sup>v</sup><br>10751-16 <sup>w</sup> |

**Section Continued**

- a Requires cam button spacer, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b Vertical locking bar hydraulic roller lifters, no machining required.
- c CamPonent Kit contents:  
Hydraulic Roller Lifters, set of 16 (**11532-16**)  
Pushrods, Special Length, set of 16 (**11628-16**)  
Valve Springs, set of 16 (**99838-16**)  
Valve Spring Retainers, set of 16 (**99944-16**)  
Machined Steel Valve Stem Locks, set of 32 (**99097-1**)  
Valve Stem Seals, set of 16 (**99820-16**)  
Fuel Pump Pushrod (**11985-1**)  
Cam Sprocket Bolt Locking Plate Kit (**99168-1**)  
Needle Bearing Cam Button Spacer (**99164-1**)
- d Must machine cylinder heads.
- e Standard diameter chrome silicon valve springs for 1.750" assembly height.
- f For +/- .100" long valves.
- g For standard diameter valve springs.
- h Requires Crane Multi Fit valve locks.
- i Machined steel, heat treated.
- j Machined steel, heat treated, Multi Fit.
- k Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- l Pro Series one-piece, for use with or without pushrod guideplate cylinder heads.
- m Performance steel billet gears and roller chain set.
- n Pro Series steel billet gears and roller chain set.
- o Pro Series steel billet gears and roller chain set with thrust bearing.
- p 1.5 ratio, 3/8" stud, extra long slot (not self-aligning).
- q 1.5 ratio, 3/8" stud, extra long slot, Nitro Carb (not self-aligning).
- r 1.5 ratio, 3/8" stud, self-aligning, Nitro Carb.
- s Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- t Energizer, 1.5 ratio, 3/8" stud (not self-aligning).
- u 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- v 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.
- w 1.5 ratio, 3/8" stud, self-aligning narrow body for center bolt valve covers.
- x Standard diameter PAC Enhanced valve springs for 1.750" assembly height.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts — Retrofit</b>   |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Good mid range torque and HP, fair idle, performance usage, mild bracket racing, auto trans w/3000+ converter, 3800-4600 cruise RPM, good with manifold nitrous system, 10.0 to 11.5 compression ratio advised. Good w/ Roots supercharger, 15 lbs. maximum boost, w/8.0 maximum compression ratio advised, .900" base circle for long stroke clearance.         | HR-234/365-2S-12.90 IG           | 2800-6800             | 119691 <sup>a</sup>                        | 11532-16 <sup>b</sup> | 234<br>242                                 | 296<br>304                                    | 112                           | 10 44<br>58 4                                | .000<br>.000                | .548<br>.558                  |
| Good mid to upper RPM torque and HP, fair idle, performance usage, mild bracket racing, auto trans w/3000+ converter, 3800-4600 cruise RPM, good with manifold nitrous system, 10.5 to 11.2.0 compression ratio advised. Good w/Roots supercharger, 18 lbs. maximum boost, w/8.0 maximum compression ratio advised, .900" base circle for long stroke clearance. | HR-238/372-2S2-10.90 IG          | 3000-6800             | 119581 <sup>a</sup>                        | 11532-16 <sup>b</sup> | 238<br>242                                 | 300<br>304                                    | 110                           | 14 44<br>56 6                                | .000<br>.000                | .558<br>.558                  |
| Good upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 4200-5000 cruise RPM, 10.5 to 12.0 compression ratio advised, 370+ cu.in. Also mild supercharged and/or nitrous, .860" base circle for long stroke clearance.   | HR-306-2S-10.86 IG               | 3200-7000             | 119651 <sup>a</sup>                        | 11532-16 <sup>b</sup> | 240<br>248                                 | 306<br>314                                    | 110                           | 15 45<br>59 9                                | .000<br>.000                | .558<br>.558                  |
| Rough idle, performance usage, good w/large nitrous system, good upper RPM torque and HP, 370+ cu.in., bracket racing, auto trans w/3500+ converter, 4200-5000 cruise RPM, 10.5 to 12.0 compression ratio advised, .860" base circle for long stroke clearance. Good w/ Roots supercharger, 18 lbs. maximum boost w/8.0 maximum compression ratio advised.       | HR-240/372-2S1-14.86 IG          | 3400-7200             | 119681 <sup>a</sup>                        | 11532-16 <sup>b</sup> | 240<br>248                                 | 306<br>314                                    | 114                           | 11 49<br>63 5                                | .000<br>.000                | .558<br>.558                  |
| Rough idle, performance usage, good w/large nitrous system, good upper RPM torque and HP, 370+ cu.in., bracket racing, auto trans w/3500+ converter, 10.5 to 12.5 compression ratio advised, .900" base circle for long stroke clearance. Good w/ Roots supercharger, 20 lbs. max. boost w/8.0 max. compression ratio advised.                                   | HR-242/372-2S-12.90 IG           | 3600-7200             | 119591 <sup>a</sup>                        | 11532-16 <sup>b</sup> | 242<br>250                                 | 304<br>312                                    | 112                           | 14 48<br>62 8                                | .000<br>.000                | .558<br>.558                  |
| Rough idle, performance usage, good w/large nitrous system, good upper RPM torque and HP, 380+ cu.in., bracket racing, auto trans w/4000+ converter, 11.0 to 12.5 compression ratio advised. Good w/ Roots supercharger, 22 lbs. maximum boost w/8.0 maximum compression ratio advised.  | HR-246/372-2S-14 IG              | 3800-7200             | 119601 <sup>a</sup>                        | 11532-16 <sup>b</sup> | 246<br>254                                 | 308<br>316                                    | 114                           | 14 52<br>66 8                                | .000<br>.000                | .558<br>.558                  |
| Competition only, good upper RPM torque and HP, 370+ cu.in., bracket racing, auto trans w/4000+ converter, 11.5 to 13.0 compression ratio advised, .860" base circle for long stroke clearance.  | HR-250/372-2S-10.86 IG           | 4000-7200             | 119611 <sup>a</sup>                        | 11532-16 <sup>b</sup> | 250<br>258                                 | 316<br>324                                    | 110                           | 20 50<br>64 14                               | .000<br>.000                | .558<br>.558                  |
| Competition only, good upper RPM torque and HP, 370+ cu.in., bracket racing, auto trans w/race converter, 12.0 minimum compression ratio advised.  | HR-252/400-2S-8 IG               | 4200-7200             | 119711 <sup>a</sup>                        | 11532-16 <sup>b</sup> | 252<br>256                                 | 322<br>326                                    | 108                           | 22.5 49.5<br>60.5 15.5                       | .000<br>.000                | .600<br>.600                  |
| Competition only, good upper RPM HP, 380+ cu.in., bracket racing, auto trans w/race converter, good w/large nitrous system, 12.5 minimum compression ratio advised.  | HR-258/372-2S-12.86 IG           | 4400-7200             | 119721 <sup>a</sup>                        | 11532-16 <sup>b</sup> | 258<br>266                                 | 320<br>328                                    | 112                           | 22 56<br>70 16                               | .000<br>.000                | .558<br>.558                  |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337  | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328  | See pg. 312                                     | See pg. 315                                    | See pg. 317   |
|--------------------------------|--|-----------------------------------|-----------------------|--|--|--|---|--|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS  | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS                               | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE   |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,e</sup><br>144846-16 <sup>u</sup> | 99944-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>g</sup><br>99088-1 <sup>h</sup> | 11628-16 <sup>i</sup><br>95621-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801-16 <sup>n</sup><br>11801C-16 <sup>o</sup> | 11774-16 <sup>p</sup><br>11744-16 <sup>q</sup> | 11750-16 <sup>r</sup><br>10750-16 <sup>s</sup><br>10751-16 <sup>t</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,e</sup><br>144846-16 <sup>u</sup> | 99944-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>g</sup><br>99088-1 <sup>h</sup> | 11628-16 <sup>i</sup><br>95621-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801-16 <sup>n</sup><br>11801C-16 <sup>o</sup> | 11774-16 <sup>p</sup><br>11744-16 <sup>q</sup> | 11750-16 <sup>r</sup><br>10750-16 <sup>s</sup><br>10751-16 <sup>t</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,e</sup><br>144846-16 <sup>u</sup> | 99944-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>g</sup><br>99088-1 <sup>h</sup> | 11628-16 <sup>i</sup><br>95621-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801-16 <sup>n</sup><br>11801C-16 <sup>o</sup> | 11774-16 <sup>p</sup><br>11744-16 <sup>q</sup> | 11750-16 <sup>r</sup><br>10750-16 <sup>s</sup><br>10751-16 <sup>t</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,e</sup><br>144846-16 <sup>u</sup> | 99944-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>g</sup><br>99088-1 <sup>h</sup> | 11628-16 <sup>i</sup><br>95621-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801-16 <sup>n</sup><br>11801C-16 <sup>o</sup> | 11774-16 <sup>p</sup><br>11744-16 <sup>q</sup> | 11750-16 <sup>r</sup><br>10750-16 <sup>s</sup><br>10751-16 <sup>t</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,e</sup><br>144846-16 <sup>u</sup> | 99944-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>g</sup><br>99088-1 <sup>h</sup> | 11628-16 <sup>i</sup><br>95621-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801-16 <sup>n</sup><br>11801C-16 <sup>o</sup> | 11774-16 <sup>p</sup><br>11744-16 <sup>q</sup> | 11750-16 <sup>r</sup><br>10750-16 <sup>s</sup><br>10751-16 <sup>t</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,e</sup><br>144846-16 <sup>u</sup> | 99944-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>g</sup><br>99088-1 <sup>h</sup> | 11628-16 <sup>i</sup><br>95621-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801-16 <sup>n</sup><br>11801C-16 <sup>o</sup> | 11774-16 <sup>p</sup><br>11744-16 <sup>q</sup> | 11750-16 <sup>r</sup><br>10750-16 <sup>s</sup><br>10751-16 <sup>t</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,e</sup><br>144846-16 <sup>u</sup> | 99944-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>g</sup><br>99088-1 <sup>h</sup> | 11628-16 <sup>i</sup><br>95621-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801-16 <sup>n</sup><br>11801C-16 <sup>o</sup> | 11774-16 <sup>p</sup><br>11744-16 <sup>q</sup> | 11750-16 <sup>r</sup><br>10750-16 <sup>s</sup><br>10751-16 <sup>t</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,e</sup><br>144846-16 <sup>u</sup> | 99944-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>g</sup><br>99088-1 <sup>h</sup> | 11628-16 <sup>i</sup><br>95621-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801-16 <sup>n</sup><br>11801C-16 <sup>o</sup> | 11774-16 <sup>p</sup><br>11744-16 <sup>q</sup> | 11750-16 <sup>r</sup><br>10750-16 <sup>s</sup><br>10751-16 <sup>t</sup> |
| 11307-1 <sup>c,d</sup>         | 99838-16 <sup>d</sup><br>96877-16 <sup>d,e</sup><br>144846-16 <sup>u</sup> | 99944-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>g</sup><br>99088-1 <sup>h</sup> | 11628-16 <sup>i</sup><br>95621-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801-16 <sup>n</sup><br>11801C-16 <sup>o</sup> | 11774-16 <sup>p</sup><br>11744-16 <sup>q</sup> | 11750-16 <sup>r</sup><br>10750-16 <sup>s</sup><br>10751-16 <sup>t</sup> |

- a** Requires cam button spacer, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b** Vertical locking bar hydraulic roller lifters, no machining required.
- c** CamPonent Kit contents:  
Hydraulic Roller Lifters, set of 16 (**11532-16**)  
Pushrods, Special Length, set of 16 (**11628-16**)  
Valve Springs, set of 16 (**99838-16**)  
Valve Spring Retainers, set of 16 (**99944-16**)  
Machined Steel Valve Stem Locks, set of 32 (**99097-1**)  
Valve Stem Seals, set of 16 (**99820-16**)  
Fuel Pump Pushrod (**11985-1**)  
Cam Sprocket Bolt Locking Plate Kit (**99168-1**)  
Needle Bearing Cam Button Spacer (**99164-1**)
- d** Must machine cylinder heads.
- e** For +.100" long valves.
- f** Requires Crane Multi Fit valve locks.
- g** Machined steel, heat treated.
- h** Machined steel, heat treated, Multi Fit.
- i** Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- j** Pro Series one-piece, for use with or without pushrod guideplate cylinder heads.
- k** Performance steel billet gears and roller chain set.
- l** Pro Series steel billet gears and roller chain set.
- m** Pro Series steel billet gears and roller chain set with thrust bearing.
- n** 1.5 ratio, 3/8" stud, extra long slot (not self-aligning).
- o** 1.5 ratio, 3/8" stud, extra long slot, Nitro Carb (not self-aligning).
- p** Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- q** Energizer, 1.5 ratio, 3/8" stud (not self-aligning).
- r** 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- s** 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.
- t** 1.5 ratio, 3/8" stud, self-aligning narrow body for center bolt valve covers.
- u** Standard diameter PAC Enhanced valve springs for 1.750" assembly height.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number                  | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code   | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh. | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|---|-----------------------|--|-----------------|--|---|-------------------------------|---|-----------------------------|-------------------------------|
| <b>Mechanical Lifter Camshafts</b>   |   |                       |  |                 |  |   |                               |   |                             |                               |
| Replacement for factory 340 HP 327 cu.in. Duntov camshaft.   | <b>BluePrinted<br/>3736097</b>                    | 2000-<br>5600         | <b>110901</b>                                | <b>99250-16</b> | 227<br>230                                 | 260<br>268                                    | 110.5                         | 3.5 43.5<br>46 4                              | .012<br>.018                | .393<br>.399                  |
| Excellent low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 2600-3000 cruise RPM, limited oval track, 8.75 to 10.0 compression ratio advised.   | <b>F-228/3067-2-6</b>                             | 2400-<br>6000         | <b>110911*</b>                               | <b>99250-16</b> | 228<br>238                                 | 290<br>300                                    | 106                           | 12 36<br>49 9                                 | .022<br>.022                | .460<br>.480                  |
| Good low end and mid range torque and HP, good idle, daily performance usage, auto trans w/stock to 2500 converter, 2600-3000 cruise RPM, 9.25 to 10.75 compression ratio advised.   | <b>F-228/3067-2-10</b>                            | 2600-<br>6200         | <b>110931*</b>                               | <b>99250-16</b> | 228<br>238                                 | 290<br>300                                    | 110                           | 9 39<br>54 4                                  | .022<br>.022                | .460<br>.480                  |
| Good mid range to upper RPM torque and HP, fair idle, moderate performance usage, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised. Good w/centrifugal or Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised.   | <b>F-238/3200-14</b>                              | 3000-<br>6600         | <b>110941*</b>                               | <b>99250-16</b> | 238<br>238                                 | 278<br>278                                    | 114                           | 10 48<br>58 0                                 | .022<br>.022                | .480<br>.480                  |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, bracket racing, good w/plate or manifold nitrous system, 3400-3800 cruise RPM, 10.0 to 11.5 compression ratio advised. Good w/centrifugal or Roots supercharger, 10 lbs. maximum boost w/8.5 maximum compression ratio advised. | <b>F-278-2</b>                                    | 3000-<br>6800         | <b>113841*</b>                               | <b>99250-16</b> | 238<br>248                                 | 278<br>288                                    | 114                           | 10 48<br>63 5                                 | .022<br>.022                | .480<br>.500                  |
| Replacement for factory 330 HP 350 cu.in. camshaft.  | <b>BluePrinted<br/>3972182</b>                    | 2800-<br>6600         | <b>110951</b>                                | <b>99250-16</b> | 242<br>254                                 |   | 116                           | 11 51<br>69 5                                 | .020<br>.025                | .459<br>.485                  |
| Good mid range torque, performance usage, bracket racing; Heavy, Pro ET, Super ET, etc., auto trans w/3000+ converter, oval track; Late Model, Sportsman, I.M.C.A., etc., 1/4-3/8 mile, 10.5 to 12.0 compression ratio advised.  | <b>Saturday Night Special<br/>F-244/3454-25-6</b> | 3200-<br>6800         | <b>110921*</b><br><b>110922*<sup>a</sup></b> | <b>99250-16</b> | 244<br>252                                 | 280<br>288                                    | 106                           | 19 45<br>55 17                                | .026<br>.026                | .518<br>.536                  |
| Good mid range torque and HP, rough idle, moderate performance usage, 3600-4000 cruise RPM, good with plate or small manifold nitrous system, 10.5 to 12.0 compression ratio advised. Also good for mild supercharged.   | <b>F-280-2</b>                                    | 3200-<br>7000         | <b>114681*</b>                               | <b>99250-16</b> | 244<br>252                                 | 280<br>288                                    | 112                           | 14 50<br>62 10                                | .026<br>.026                | .518<br>.536                  |
| Performance usage, bracket racing; Heavy, Pro ET, Super ET, etc., auto trans w/3000+ converter, oval track; Late Model, Sportsman, I.M.C.A., etc., 1/4-3/8 mile, 11.0 to 12.5 compression ratio advised.   | <b>F-248/3334-6</b>                               | 3400-<br>7000         | <b>110961*</b>                               | <b>99250-16</b> | 248<br>248                                 | 288<br>288                                    | 106                           | 22 46<br>54 14                                | .022<br>.022                | .500<br>.500                  |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Self-aligning rocker arms cannot be used with mechanical lifter camshafts.

**NOTE:** When using 55-56, 265 cu.in. blocks, late model cam bearings must be installed.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Camshafts having standard size journals with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts for modified standard blocks, or Oldsmobile/Dart blocks, having Big Block Chevrolet size (1.948") cam bearings are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts specifically engineered for engines that have .875" or .904" diameter lifters are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                    | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328  | See pg. 312                                     | See pg. 315   | See pg. 317                                    |
|--------------------------------|--|-----------------------------------|-----------------------|--|---|--|---|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                  | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
| 11308-1 <sup>b,c</sup>         | 99848-16 <sup>b,c</sup>                        | 99915-16 <sup>b</sup>             |                       | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup>                           | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11309-1 <sup>d,e</sup>         | 99846-16 <sup>e</sup><br>96877-16 <sup>f</sup> | 99915-16 <sup>b</sup><br>99943-16 | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup>                           | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11309-1 <sup>d,e</sup>         | 99846-16 <sup>e</sup><br>96877-16 <sup>f</sup> | 99915-16 <sup>b</sup><br>99943-16 | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup>                           | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
|                                | 96877-16 <sup>f</sup>                          | 99943-16                          | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup>                           | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
|                                | 96877-16 <sup>f</sup>                          | 99943-16                          | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup>                           | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
|                                | 96877-16 <sup>f</sup>                          | 99943-16                          | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup>                           | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11309-1 <sup>d,e</sup>         | 99846-16 <sup>e</sup><br>96877-16 <sup>f</sup> | 99915-16 <sup>b</sup><br>99943-16 | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup><br>11801C-16 <sup>r</sup> | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
|                                | 96877-16 <sup>f</sup>                          | 99943-16                          | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup><br>11801C-16 <sup>r</sup> | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11309-1 <sup>d,e</sup>         | 99846-16 <sup>e</sup><br>96877-16 <sup>f</sup> | 99915-16 <sup>b</sup><br>99943-16 | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup><br>11801C-16 <sup>r</sup> | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |

Section Continued

- a Cam, lifter and valve spring (99846-16) kit, includes installation lubricants. Contains standard diameter valve springs, no machining required.
- b Contains standard diameter valve springs, no machining required.
- c For 1967-87 with 1.700" assembly height.
- d Contains standard diameter valve springs and machined steel valve stem locks (99095-1), no machining required.
- e Standard diameter XHTCS tool steel valve springs for 1.800" assembly height.
- f Must machine cylinder heads.
- g Standard diameter chrome silicon valve springs for 1.750" assembly height.
- h For standard diameter valve springs, no machining required.
- i Machined steel, heat treated.
- j Machined steel, heat treated, +.050" assembly height.

- k Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- l Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- m Pro Series one-piece.
- n Performance steel billet gears and roller chain set.
- o Pro Series steel billet gears and roller chain set.
- p Pro Series steel billet gears and roller chain set with thrust bearing.
- q 1.5 ratio, 3/8" stud, extra long slot (not self-aligning).
- r 1.5 ratio, 3/8" stud, extra long slot, Nitro Carb (not self-aligning).
- s Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- t 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- u 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application                        | Camshaft Series/<br>Grind Number  | RPM<br>POWER<br>RANGE                     | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                        | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.    | Gross<br>Lift<br>Int. |              |
|------------------------------------|---|---|--|--------------------------------|--|---|-------------------------------|--|------------------------|-----------------------|--------------|
| <b>Mechanical Lifter Camshafts</b> | Good mid range torque and HP, rough idle, moderate performance usage, good w/manifold nitrous system, bracket racing, auto trans w/3000+ converter, 3800-4200 cruise RPM, 11.0 to 12.5 compression ratio advised. Good w/Roots supercharger, 15 lbs. maximum boost w/8.0 maximum compression ratio advised. | 3400-7200                                 | 113861*                                    | 99250-16                       | 248<br>258                                 | 288<br>298                                    | 114                           | 15 53<br>68 10                               | .022<br>.022           | .500<br>.520          |              |
|                                    | Performance usage, good mid and upper RPM torque and HP, bracket racing; Pro, Pro ET, Super ET, etc., auto trans w/race converter, oval track; Late Model, Sportsman, I.M.C.A., etc., 3/8-1/2 mile, 11.0 to 12.5 compression ratio advised.   | 3600-7000                                 | 12003*                                     | 99250-16                       | 250<br>260                                 | 285<br>295                                    | 106                           | 21 49<br>58 22                               | .026<br>.028           | .533<br>.555          |              |
|                                    | Performance usage, good mid range torque and HP, bracket racing; Pro, Pro ET, Super ET, etc., auto trans w/ race converter, oval track; Late Model, Sportsman, I.M.C.A., etc., 3/8-1/2 mile, 11.5 to 12.5 compression ratio advised.  | 3800-7200                                 | Saturday Night Special<br>F-252/3574-25-6  | 110981*<br>110982 <sup>a</sup> | 99250-16                                   | 252<br>260                                    | 288<br>296                    | 106  | 22 50<br>58 22         | .026<br>.026          | .536<br>.554 |
|                                    | Good mid range HP, rough idle, performance usage, 4000-4400 cruise RPM, good w/manifold nitrous system, 11.5 to 12.5 compression ratio advised. Good w/ Roots supercharger, 18 lbs. maximum boost w/8.0 maximum compression ratio advised.  | 3800-7600                                 | F-290-2                                    | 114691*                        | 99250-16                                   | 252<br>260                                    | 290<br>298                    | 112  | 17 55<br>65 15         | .026<br>.026          | .536<br>.554 |
|                                    | Replacement for factory 290 HP 302 cu.in. Z-28 camshaft.  | BluePrinted<br>3849346                    | 4000-7000                                  | 967251                         | 99250-16                                   | 254<br>254                                    |                               | 114  | 15 59<br>63 11         | .030<br>.030          | .485<br>.485 |
|                                    | Competition only, serious flat lifter restricted oval track; Late Model, Sportsman, etc., 3/8-1/2 mile, intended for 1.8 intake and 1.7 exhaust ratio rocker arms, 11.5 to 12.5 compression ratio advised.  | F-256/340-25-8                            | 4000-7800                                  | 110971*                        | 99250-16                                   | 256<br>260                                    | 288<br>292                    | 108  | 26 50<br>64 16         | .018<br>.020          | .612<br>.578 |
|                                    | Performance usage, good mid range torque and HP, bracket racing; Pro, Pro ET, Super ET, etc., auto trans w/ race converter, oval track; Late Model, Sportsman, I.M.C.A., etc., 3/8-1/2 mile, 11.5 to 12.5 compression ratio advised.  | Saturday Night Special<br>F-256/3634-25-5 | 4000-7600                                  | 111411*<br>111412 <sup>a</sup> | 99250-16                                   | 256<br>264                                    | 292<br>300                    | 105  | 25 51<br>59 25         | .026<br>.026          | .545<br>.563 |
|                                    | Replacement for factory Off Road Special camshaft.  | BluePrinted<br>3927140                    | 4200-7200                                  | 968821                         | 99250-16                                   | 257<br>269                                    |                               | 112  | 20.5 56.5<br>70.5 18.5 | .024<br>.026          | .493<br>.512 |
|                                    | Performance usage, good mid and upper RPM HP, bracket racing; Pro, Super Pro, Hot Rod, Super ET, etc., auto trans w/race converter, oval track; Late Model, Sportsman, I.M.C.A., etc., 3/8-1/2 mile, 11.5 minimum compression ratio advised.  | F-260/3694-25-6                           | 4400-7600                                  | 111431*                        | 99250-16                                   | 260<br>268                                    | 296<br>304                    | 106  | 26 54<br>62 26         | .026<br>.026          | .554<br>.572 |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Self-aligning rocker arms cannot be used with mechanical lifter camshafts.

**NOTE:** When using 55-56, 265 cu.in. blocks, late model cam bearings must be installed.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Camshafts having standard size journals with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts for modified standard blocks, or Oldsmobile/Dart blocks, having Big Block Chevrolet size (1.948") cam bearings are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts specifically engineered for engines that have .875" or .904" diameter lifters are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337   | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328  | See pg. 312                                     | See pg. 315   | See pg. 317                                    |
|--------------------------------|---|-----------------------------------|-----------------------|--|---|--|---|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS   | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 96877-16 <sup>f</sup>   | 99943-16                          | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup><br>11801C-16 <sup>r</sup> | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11309-1 <sup>b,c</sup>         | 99846-16 <sup>c</sup><br>96802-16 <sup>g</sup><br>96877-16 <sup>f</sup> | 99915-16 <sup>h</sup><br>99943-16 | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801C-16 <sup>r</sup>                          | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11309-1 <sup>b,c</sup>         | 99846-16 <sup>c</sup><br>96802-16 <sup>g</sup><br>96877-16 <sup>f</sup> | 99915-16 <sup>h</sup><br>99943-16 | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801C-16 <sup>r</sup>                          | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11309-1 <sup>b,c</sup>         | 99846-16 <sup>c</sup><br>96802-16 <sup>g</sup><br>96877-16 <sup>f</sup> | 99915-16 <sup>h</sup><br>99943-16 | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801C-16 <sup>r</sup>                          | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11308-1 <sup>d,e</sup>         | 99848-16 <sup>d,e</sup><br>96802-16 <sup>g</sup>                        | 99915-16 <sup>h</sup><br>99943-16 |                       | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801-16 <sup>q</sup><br>11801C-16 <sup>r</sup> | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
|                                | 96877-16 <sup>f</sup>   | 99943-16                          | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801C-16 <sup>r</sup>                          | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11309-1 <sup>b,c</sup>         | 99846-16 <sup>c</sup><br>96802-16 <sup>g</sup><br>96877-16 <sup>f</sup> | 99915-16 <sup>h</sup><br>99943-16 | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801C-16 <sup>r</sup>                          | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11309-1 <sup>b,c</sup>         | 99846-16 <sup>c</sup><br>96802-16 <sup>g</sup><br>96877-16 <sup>f</sup> | 99915-16 <sup>h</sup><br>99943-16 | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801C-16 <sup>r</sup>                          | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |
| 11309-1 <sup>b,c</sup>         | 99846-16 <sup>c</sup><br>96802-16 <sup>g</sup><br>96877-16 <sup>f</sup> | 99915-16 <sup>h</sup><br>99943-16 | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99095-1 <sup>j</sup> | 11621-16 <sup>k</sup><br>11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11975-1 <sup>n</sup><br>11984-1 <sup>o</sup><br>11977-1 <sup>p</sup> | 11801C-16 <sup>r</sup>                          | 11774-16 <sup>s</sup>                               | 11750-16 <sup>t</sup><br>10750-16 <sup>u</sup> |

Section Continued

- a Cam, lifter and valve spring (99846-16) kit, includes installation lubricants. Contains standard diameter valve springs, no machining required.
- b Contains standard diameter valve springs and machined steel valve stem locks (99095-1), no machining required.
- c Standard diameter XHTCS tool steel valve springs for 1.800" assembly height.
- d Contains standard diameter valve springs, no machining required.
- e For 1967-87 with 1.700" assembly height.
- f Must machine cylinder heads.
- g Standard diameter chrome silicon valve springs for 1.750" assembly height.
- h For standard diameter valve springs, no machining required.
- i Machined steel, heat treated.
- j Machined steel, heat treated, +.050" assembly height.

- k Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- l Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- m Pro Series one-piece.
- n Performance steel billet gears and roller chain set.
- o Pro Series steel billet gears and roller chain set.
- p Pro Series steel billet gears and roller chain set with thrust bearing.
- q 1.5 ratio, 3/8" stud, extra long slot (not self-aligning).
- r 1.5 ratio, 3/8" stud, extra long slot, Nitro Carb (not self-aligning).
- s Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- t 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- u 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number                  | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code    | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|---|-----------------------|---|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Lifter Camshafts</b>   |   |                       |   |                 |  |   |                               |  |                             |                               |
| Performance usage, good mid and upper RPM HP, bracket racing; Pro, Super Pro, Hot Rod, Super ET, etc., auto trans w/race converter, oval track; Late Model, Sportsman, I.M.C.A., etc., 3/8-1/2 mile, serious off road, 11.5 minimum compression ratio advised.                         | <b>Saturday Night Special<br/>F-260/370-2-6</b>   | 4400-<br>7600         | <b>111451*</b><br><b>111452<sup>a</sup></b>   | <b>99250-16</b> | 260<br>270                                 | 295<br>305                                    | 106                           | 28 52<br>65 25                               | .026<br>.028                | .555<br>.578                  |
| Competition only, serious flat lifter restricted oval track; Late Model, Sportsman, etc., 3/8-5/8 mile, intended for 1.8 intake and 1.5 ratio exhaust rocker arms, 12.0 minimum compression ratio advised.   | <b>F-262/340-2S-7</b>                             | 4400-<br>7800         | <b>110991*</b>                                | <b>99250-16</b> | 262<br>268                                 | 294<br>304                                    | 107                           | 28 54<br>64 24                               | .020<br>.026                | .612<br>.572                  |
| Good upper RPM torque and HP, rough idle, moderate performance usage, good upper RPM HP, 4400-4800 cruise RPM, good w/large manifold nitrous system, 11.5 to 12.5 compression ratio advised. Good w/Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised. | <b>F-300-2</b>                                    | 4600-<br>8200         | <b>114701*</b>                                | <b>99250-16</b> | 264<br>272                                 | 300<br>308                                    | 112                           | 23 61<br>71 21                               | .026<br>.026                | .563<br>.581                  |
| Competition only, good upper RPM torque and HP, bracket racing; Pro, Super Pro, Hot Rod, etc., auto trans w/race converter, oval track; Late Model, Sportsman, I.M.C.A., etc., 3/8-1/2 mile, 12.0 minimum compression ratio advised.   | <b>Saturday Night Special<br/>F-268/3814-2S-6</b> | 4600-<br>8000         | <b>111501*</b><br><b>111502<sup>a,b</sup></b> | <b>99250-16</b> | 268<br>276                                 | 304<br>312                                    | 106                           | 31 57<br>67 29                               | .026<br>.026                | .572<br>.590                  |
| Competition only, good upper RPM torque and HP, 360+ cu.in., bracket racing; Quick ET, etc., auto trans w/race converter, 12.5 minimum compression ratio advised.  | <b>F-310</b>                                      | 4800-<br>8200         | <b>114711*</b>                                | <b>99250-16</b> | 272<br>272                                 | 310<br>310                                    | 108                           | 31 61<br>67 25                               | .026<br>.026                | .581<br>.581                  |
| Competition only, good upper RPM HP, 370+ cu.in., bracket racing; Quick ET, etc., auto trans w/race converter, 12.5 minimum compression ratio advised.   | <b>F-276/3934-2S-6</b>                            | 4800-<br>8400         | <b>111001*</b>                                | <b>99250-16</b> | 276<br>284                                 | 312<br>320                                    | 106                           | 34 62<br>70 34                               | .026<br>.026                | .590<br>.608                  |
| Radical Competition only, good high RPM HP, 380+ cu. in., flat lifter restricted classes, stick or auto trans. w/race converter, 12.5 minimum compression ratio advised.   | <b>F-320</b>                                      | 5000-<br>8600         | <b>114721*</b>                                | <b>99250-16</b> | 280<br>280                                 | 320<br>320                                    | 108                           | 35 65<br>71 29                               | .026<br>.026                | .599<br>.599                  |
| Radical Competition only, good high RPM HP, 388+ cu. in., flat lifter restricted classes, stick or auto trans. w/race converter, 12.5 minimum compression ratio advised.   | <b>F-280/3994-2S-8</b>                            | 5000-<br>8800         | <b>111751*</b>                                | <b>99250-16</b> | 280<br>288                                 | 316<br>324                                    | 108                           | 35 65<br>75 33                               | .026<br>.026                | .599<br>.617                  |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Self-aligning rocker arms cannot be used with mechanical lifter camshafts.

**NOTE:** When using 55-56, 265 cu.in. blocks, late model cam bearings must be installed.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Camshafts having standard size journals with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts for modified standard blocks, or Oldsmobile/Dart blocks, having Big Block Chevrolet size (1.948") cam bearings are available on special order. Contact Crane's Performance Consultants for details.

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**CRANE VALVE TRAIN COMPONENTS**










| See pg. 358                    | See pg. 337                                    | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328  | See pg. 312            | See pg. 315   | See pg. 317                                    |
|--------------------------------|--|-----------------------------------|-----------------------|--|---|--|------------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                  | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS      | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
| 11309-1 <sup>c,d</sup>         | 99846-16 <sup>d</sup><br>96877-16 <sup>b</sup> | 99915-16 <sup>e</sup><br>99943-16 | 99820-16 <sup>b</sup> | 99097-1 <sup>f</sup><br>99095-1 <sup>g</sup> | 11621-16 <sup>h</sup><br>11630-16 <sup>i</sup><br>95636-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801C-16 <sup>n</sup> | 11774-16 <sup>o</sup>                               | 11750-16 <sup>p</sup><br>10750-16 <sup>q</sup> |
|                                | 96877-16 <sup>b</sup>                          | 99943-16                          | 99820-16 <sup>b</sup> | 99097-1 <sup>f</sup><br>99095-1 <sup>g</sup> | 11621-16 <sup>h</sup><br>11630-16 <sup>i</sup><br>95636-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> | 11801C-16 <sup>n</sup> | 11774-16 <sup>o</sup>                               | 11750-16 <sup>p</sup><br>10750-16 <sup>q</sup> |
|                                | 96877-16 <sup>b</sup>                          | 99943-16                          | 99820-16 <sup>b</sup> | 99097-1 <sup>f</sup><br>99095-1 <sup>g</sup> | 11621-16 <sup>h</sup><br>11630-16 <sup>i</sup><br>95636-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> |                        | 11774-16 <sup>o</sup>                               | 11750-16 <sup>p</sup><br>10750-16 <sup>q</sup> |
|                                | 96877-16 <sup>b</sup>                          | 99943-16                          | 99820-16 <sup>b</sup> | 99097-1 <sup>f</sup><br>99095-1 <sup>g</sup> | 11621-16 <sup>h</sup><br>11630-16 <sup>i</sup><br>95636-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> |                        | 11774-16 <sup>o</sup>                               | 11750-16 <sup>p</sup><br>10750-16 <sup>q</sup> |
|                                | 96877-16 <sup>b</sup>                          | 99943-16                          | 99820-16 <sup>b</sup> | 99097-1 <sup>f</sup><br>99095-1 <sup>g</sup> | 11621-16 <sup>h</sup><br>11630-16 <sup>i</sup><br>95636-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> |                        | 11774-16 <sup>o</sup>                               | 11750-16 <sup>p</sup><br>10750-16 <sup>q</sup> |
|                                | 96877-16 <sup>b</sup>                          | 99943-16                          | 99820-16 <sup>b</sup> | 99097-1 <sup>f</sup><br>99095-1 <sup>g</sup> | 11621-16 <sup>h</sup><br>11630-16 <sup>i</sup><br>95636-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> |                        | 11774-16 <sup>o</sup>                               | 11750-16 <sup>p</sup><br>10750-16 <sup>q</sup> |
|                                | 96877-16 <sup>b</sup>                          | 99943-16                          | 99820-16 <sup>b</sup> | 99097-1 <sup>f</sup><br>99095-1 <sup>g</sup> | 11621-16 <sup>h</sup><br>11630-16 <sup>i</sup><br>95636-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> |                        | 11774-16 <sup>o</sup>                               | 11750-16 <sup>p</sup><br>10750-16 <sup>q</sup> |
|                                | 96877-16 <sup>b</sup>                          | 99943-16                          | 99820-16 <sup>b</sup> | 99097-1 <sup>f</sup><br>99095-1 <sup>g</sup> | 11621-16 <sup>h</sup><br>11630-16 <sup>i</sup><br>95636-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> |                        | 11774-16 <sup>o</sup>                               | 11750-16 <sup>p</sup><br>10750-16 <sup>q</sup> |
|                                | 96877-16 <sup>b</sup>                          | 99943-16                          | 99820-16 <sup>b</sup> | 99097-1 <sup>f</sup><br>99095-1 <sup>g</sup> | 11621-16 <sup>h</sup><br>11630-16 <sup>i</sup><br>95636-16 <sup>j</sup> | 11975-1 <sup>k</sup><br>11984-1 <sup>l</sup><br>11977-1 <sup>m</sup> |                        | 11774-16 <sup>o</sup>                               | 11750-16 <sup>p</sup><br>10750-16 <sup>q</sup> |

- a Cam, lifter and valve spring (99846-16) kit, includes installation lubricants. Contains standard diameter valve springs, no machining required.
- b Must machine cylinder heads.
- c Contains standard diameter valve springs and machined steel valve stem locks (99095-1), no machining required.
- d Standard diameter XHTCS tool steel valve springs for 1.800" assembly height.
- e For standard diameter valve springs, no machining required.
- f Machined steel, heat treated.
- g Machined steel, heat treated, +.050" assembly height.
- h Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- i Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- j Pro Series one-piece.

- k Performance steel billet gears and roller chain set.
- l Pro Series steel billet gears and roller chain set.
- m Pro Series steel billet gears and roller chain set with thrust bearing.
- n 1.5 ratio, 3/8" stud, extra long slot, Nitro Carb (not self-aligning).
- o Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning).
- p 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- q 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS   | Degrees<br>Duration<br>@ .050"<br>Int/Exh.  | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|---|---|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b><br>Excellent low end and mid range torque and HP, good idle, daily performance usage, mild bracket racing, auto trans w/2500+ converter, 3000-3400 cruise RPM, 9.5 to 11.0 compression ratio advised.   | <b>SR-228/338-2S-12 IG</b>       | 2200-6200             | <b>118541<sup>a</sup></b>                  | 11515-16 <sup>c</sup><br>11519-16 <sup>d</sup><br>11570-16 <sup>e</sup> | 228   | 278   | 112                           | 7 41   | .020                        | .507                          |
|  |                                  |                       |  |   | 236   | 280   | 55 1                          | .020   | .525                        |                               |
|  |                                  |                       |  |   |    |   |                               |  |                             |                               |
| Good low end & mid range torque & HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/3000+ converter, 3400-3800 cruise RPM, good w/plate or manifold nitrous system, 10.5 to 11.5 compression ratio advised, .900" base circle for long stroke clearance. Good w/centrifugal or small Roots supercharger, 10 lbs. max. boost w/8.5 max. compression ratio advised. | <b>SR-232/350-2S-12.90 IG</b>    | 2400-6600             | <b>118571<sup>a</sup></b>                  | 11515-16 <sup>c</sup><br>11519-16 <sup>d</sup><br>11570-16 <sup>e</sup> | 232   | 286   | 112                           | 9 43   | .020                        | .525                          |
|  |                                  |                       |  |   | 240   | 294   | 57 3                          | .020   | .543                        |                               |
|  |                                  |                       |  |   |    |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/3000+ converter, 3400-3800 cruise RPM, good w/plate or manifold nitrous system, 10.5 to 11.5 compression ratio advised. Good w/centrifugal or small Roots supercharger, 10 lbs. maximum boost w/8.5 maximum compression ratio advised.                                    | <b>SR-236/350-2S-12 IG</b>       | 2400-6600             | <b>118551<sup>a</sup></b>                  | 11515-16 <sup>c</sup><br>11519-16 <sup>d</sup><br>11570-16 <sup>e</sup> | 236   | 286   | 112                           | 11 45  | .020                        | .525                          |
|  |                                  |                       |  |   | 244   | 294   | 59 5                          | .020   | .543                        |                               |
|  |                                  |                       |  |   |    |   |                               |  |                             |                               |
| Good mid range torque and HP, fair idle, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised, .900" base circle for long stroke clearance in 388+ cu.in.  | <b>SR-240/362-2S-10.90 IG</b>    | 3000-7000             | <b>118581<sup>a</sup></b>                  | 11515-16 <sup>c</sup><br>11519-16 <sup>d</sup><br>11570-16 <sup>e</sup> | 240   | 294   | 110                           | 15 45  | .020                        | .543                          |
|  |                                  |                       |  |   | 248   | 302   | 59 9                          | .020   | .561                        |                               |
|  |                                  |                       |  |   |    |   |                               |  |                             |                               |
| Good mid to upper RPM torque and HP, fair idle, performance usage, good w/manifold nitrous system, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compress. ratio advised, .900" base circle for long stroke clearance. Good w/Roots supercharger, 14 lbs. max. boost w/8.0 max. compress. ratio advised.  | <b>SR-240/362-2S-12.90 IG</b>    | 3400-7200             | <b>118611<sup>a</sup></b>                  | 11515-16 <sup>c</sup><br>11519-16 <sup>d</sup><br>11570-16 <sup>e</sup> | 240   | 294   | 112                           | 13 47  | .020                        | .543                          |
|  |                                  |                       |  |   | 248   | 302   | 61 7                          | .020   | .561                        |                               |
|  |                                  |                       |  |   |  |   |                               |  |                             |                               |
| Good mid range torque and HP, performance usage, bracket racing, Heavy, Pro, etc., auto trans w/race converter, serious off road, oval track, good mid-range torque and HP, 2-bbl or 4-bbl, 1/4-3/8 mile, 11.0 to 12.5 compression ratio advised.  | <b>TR-242/3867-2S-6</b>          | 3600-7200             | <b>118131<sup>b</sup></b>                  | 11515-16 <sup>c</sup><br>11519-16 <sup>d</sup><br>11570-16 <sup>e</sup> | 242   | 282   | 106                           | 17 45  | .022                        | .580                          |
|  |                                  |                       |  |   | 250   | 290   | 53 17                         | .022   | .600                        |                               |
|  |                                  |                       |  |   |  |   |                               |  |                             |                               |
| Good mid to upper RPM torque and HP, fair idle, performance usage, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised.   | <b>SR-244/362-2S-12 IG</b>       | 3400-7200             | <b>118521<sup>a</sup></b>                  | 11515-16 <sup>c</sup><br>11519-16 <sup>d</sup><br>11570-16 <sup>e</sup> | 244   | 294   | 112                           | 15 49  | .020                        | .543                          |
|  |                                  |                       |  |   | 252   | 302   | 63 9                          | .020   | .561                        |                               |
|  |                                  |                       |  |   |  |   |                               |  |                             |                               |
| Good mid to upper RPM torque and HP, fair idle, performance usage, good w/manifold nitrous system, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised. Good w/Roots supercharger, 14 lbs. maximum boost w/8.0 maximum compression ratio advised.   | <b>SR-244/362-2S-14 IG</b>       | 3600-7400             | <b>118531<sup>a</sup></b>                  | 11515-16 <sup>c</sup><br>11519-16 <sup>d</sup><br>11570-16 <sup>e</sup> | 244   | 294   | 114                           | 13 51  | .020                        | .543                          |
|  |                                  |                       |  |   | 252   | 302   | 63 7                          | .020   | .561                        |                               |
|  |                                  |                       |  |   |  |   |                               |  |                             |                               |
| Good mid to upper RPM torque and HP, fair idle, performance usage, serious off road, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.75 to 12.5 compression ratio advised.  | <b>SR-248/400-2S-8 IG</b>        | 3600-7400             | <b>118631<sup>a</sup></b>                  | 11515-16 <sup>c</sup><br>11519-16 <sup>d</sup><br>11570-16 <sup>e</sup> | 248   | 286   | 108                           | 21 47  | .020                        | .600                          |
|  |                                  |                       |  |   | 252   | 290   | 59 13                         | .022   | .600                        |                               |
|  |                                  |                       |  |   |  |   |                               |  |                             |                               |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Self-aligning rocker arms cannot be used with mechanical lifter roller camshafts.

**NOTE:** When using 55-56, 265 cu.in. blocks, late model cam bearings must be installed.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Many options are available for these camshafts, and any of our custom ground camshafts. An iron distributor drive gear and rear journal can be specified. Drilling and tapping for Sander rear drive is available. SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) and SF01 (1-8-7-2-6-5-4-3), or 4/7 3/2 swap, are offered. Optional journal sizes are Roller Bearing (1.875"), Big Block (1.949"), Large Roller Bearing/50mm (1.969"), and 55mm (2.165") Gun drilling (where applicable) is available. Lightweight undercut journal, narrow lobe cores are offered. Lobe layouts for Buick Race/Dart, Splayed Valve, and SB2 cylinder heads are available.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                     | See pg. 350  | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328  | See pg. 312       | See pg. 315   | See pg. 317                                    |
|--------------------------------|---|--|-----------------------|--|--|--|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                   | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 99893-16 <sup>f</sup><br>96870-16 <sup>fg</sup> | 99953-16<br>99943-16 <sup>g</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup>                         | 11630-16 <sup>m</sup><br>95636-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> |                   | 11774-16 <sup>r</sup>                               | 11750-16 <sup>s</sup><br>10750-16 <sup>t</sup> |
|                                | 99893-16 <sup>f</sup><br>96870-16 <sup>fg</sup> | 99953-16<br>99943-16 <sup>g</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup>                         | 11630-16 <sup>m</sup><br>95636-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> |                   | 11774-16 <sup>r</sup>                               | 11750-16 <sup>s</sup><br>10750-16 <sup>t</sup> |
|                                | 99893-16 <sup>f</sup><br>96870-16 <sup>fg</sup> | 99953-16<br>99943-16 <sup>g</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup>                         | 11630-16 <sup>m</sup><br>95636-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> |                   | 11774-16 <sup>r</sup>                               | 11750-16 <sup>s</sup><br>10750-16 <sup>t</sup> |
|                                | 99893-16 <sup>f</sup><br>96870-16 <sup>fg</sup> | 99953-16<br>99943-16 <sup>g</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup>                         | 11630-16 <sup>m</sup><br>95636-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> |                   | 11774-16 <sup>r</sup>                               | 11750-16 <sup>s</sup><br>10750-16 <sup>t</sup> |
|                                | 99893-16 <sup>f</sup><br>96870-16 <sup>fg</sup> | 99953-16<br>99943-16 <sup>g</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup>                         | 11630-16 <sup>m</sup><br>95636-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> |                   | 11774-16 <sup>r</sup>                               | 11750-16 <sup>s</sup><br>10750-16 <sup>t</sup> |
|                                | 99885-16 <sup>f</sup><br>96883-16 <sup>fg</sup> | 99956-16<br>99675-16 <sup>i</sup><br>99970-16 <sup>j</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup><br>99087-1 <sup>l</sup> | 11630-16 <sup>m</sup><br>95636-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> |                   | 11774-16 <sup>r</sup>                               | 11750-16 <sup>s</sup><br>10750-16 <sup>t</sup> |
|                                | 99893-16 <sup>f</sup><br>96870-16 <sup>fg</sup> | 99953-16<br>99943-16 <sup>g</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup>                         | 11630-16 <sup>m</sup><br>95636-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> |                   | 11774-16 <sup>r</sup>                               | 11750-16 <sup>s</sup><br>10750-16 <sup>t</sup> |
|                                | 99893-16 <sup>f</sup><br>96870-16 <sup>fg</sup> | 99953-16<br>99943-16 <sup>g</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup>                         | 11630-16 <sup>m</sup><br>95636-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> |                   | 11774-16 <sup>r</sup>                               | 11750-16 <sup>s</sup><br>10750-16 <sup>t</sup> |
|                                | 99893-16 <sup>f</sup><br>96870-16 <sup>fg</sup> | 99953-16<br>99943-16 <sup>g</sup>                          | 99820-16 <sup>f</sup> | 99097-1 <sup>k</sup>                         | 11630-16 <sup>m</sup><br>95636-16 <sup>n</sup> | 11975-1 <sup>o</sup><br>11984-1 <sup>p</sup><br>11977-1 <sup>q</sup> |                   | 11774-16 <sup>r</sup>                               | 11750-16 <sup>s</sup><br>10750-16 <sup>t</sup> |

**Section Continued**

- a** Requires cam button spacer, camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b** Requires cam button spacer and a **11990-1** (.489" I.D.) or **11989-1** (.500" I.D. Accel) aluminum-bronze distributor drive gear. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- c** Horizontal locking bar roller lifters.
- d** Vertical locking bar roller lifters.
- e** Ultra Pro Series vertical locking bar roller lifters.
- f** Must machine cylinder heads.
- g** For cylinder heads with +.100" long valves, use **99943-16** retainers.
- h** For cylinder heads with +.100" long valves, use **99970-16** retainers and **99087-1** valve stem locks.
- i** Titanium, must use **99097-1** valve stem locks, included with the retainers.
- j** Requires Crane Multi Fit valve locks.
- k** Machined steel, heat treated.
- l** Machined steel, heat treated, Multi Fit.
- m** Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- n** Pro Series one-piece, for use with or without pushrod guideplate cylinder heads.
- o** Performance steel billet gears and roller chain set.
- p** Pro Series steel billet gears and roller chain set.
- q** Pro Series steel billet gears and roller chain set with thrust bearing.
- r** Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- s** 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- t** 1.5 ratio, 3/8" stud (not self-aligning), narrow body for center bolt valve covers.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application  | Camshaft Series/<br>Grind Number                   | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code               | LIFTERS   | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh. | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|--|-----------------------|--|---|--|---|-------------------------------|---|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b>   |  |                       |  |   |  |   |                               |   |                             |                               |
| Performance usage, bracket racing, good mid-range torque and HP, Heavy, Pro, etc., auto trans w/race converter, oval track, 1/4-3/8 mile, 11.0 to 12.5 compression ratio advised.  | <b>R-248/420-252-6</b>                             | 3800-7400             | <b>118741<sup>a</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b>                                | 248<br>256                                 | 280<br>288                                    | 106                           | 21 47<br>57 19                                | .020<br>.020                | .630<br>.630                  |
| Good upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 4200-4600 cruise RPM, 11.0 minimum compression ratio advised, 388+ cu.in., supercharged and/or nitrous.   | <b>SR-250/374-25-10.90 IG</b>                      | 3800-7400             | <b>118591<sup>b</sup></b>                                | <b>11515-16<sup>g</sup></b><br><b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b> | 250<br>258                                 | 300<br>308                                    | 110                           | 20 50<br>64 14                                | .020<br>.020                | .561<br>.561                  |
| Good upper RPM torque and HP, rough idle, performance usage, good w/manifold nitrous system, 388+ cu.in., Pro Street, bracket racing, auto trans w/3500+ converter, 4200-4600 cruise RPM, 11.0 minimum compression ratio advised, .900" base circle for long stroke clearance. Good w/Roots supercharger, 18 lbs. maximum boost w/8.0 maximum compression ratio advised. | <b>SR-250/374-25-12.90 IG</b>                      | 3800-7400             | <b>118691<sup>b</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b>                                | 250<br>258                                 | 300<br>308                                    | 112                           | 18 52<br>66 12                                | .020<br>.020                | .561<br>.561                  |
| Performance usage, bracket racing, good mid range torque & HP, Heavy, Pro, etc., auto trans w/race converter, oval track, good mid range torque and HP, 1/4-3/8 mile, serious off-road, 11.0 to 12.5 compression ratio advised.  | <b>R-252/420-25-6</b><br><b>R-252/420-25-6 SFO</b> | 4000-7600             | <b>118751<sup>a</sup></b><br><b>118761<sup>a,c</sup></b> | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b>                                | 252<br>260                                 | 284<br>292                                    | 106                           | 23 49<br>59 21                                | .020<br>.020                | .630<br>.630                  |
| Performance usage, w/manifold nitrous system, good mid and upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, 11.0 to 12.5 compression ratio advised. Good w/Roots supercharger, 18 lbs. maximum boost w/8.0 maximum compression ratio advised.  | <b>R-252/420-25-10</b>                             | 4000-7600             | <b>118911<sup>a</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b>                                | 252<br>260                                 | 284<br>292                                    | 110                           | 20 52<br>64 16                                | .020<br>.020                | .630<br>.630                  |
| Rough idle, performance usage, good w/manifold nitrous system, good upper RPM torque and HP, 388+ cu.in., Pro Street, bracket racing, auto trans w/3500+ converter, 4200-4600 cruise RPM, 11.0 minimum compression ratio advised. Good w/Roots supercharger, 18 lbs. max. boost w/8.0 max. compression ratio advised.  | <b>SR-252/374-25-12 IG</b>                         | 3800-7400             | <b>118711<sup>b</sup></b>                                | <b>11515-16<sup>g</sup></b><br><b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b> | 252<br>260                                 | 302<br>310                                    | 112                           | 19 53<br>67 13                                | .020<br>.020                | .561<br>.561                  |
| Competition only, oval track, 1/4 - 3/8 mile, flat top pistons w/7600 RPM rev limit, 12.5 minimum compression ratio advised. Lift with 1.75:1 ratio rocker arms.   | <b>R-256/4301-25-6</b>                             | 4000-7800             | <b>118971<sup>a</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b>                                | 256<br>262                                 | 284<br>290                                    | 106                           | 25 51<br>60 22                                | .020<br>.022                | .753<br>.753                  |
| Competition only, oval track, special for 360 Sprint Car, tapped for Sander rear drive, for roller bearing journals (1.875"), 12.5 minimum compression ratio advised. Lift with 1.75:1 ratio rocker arms.  | <b>R-256/4301-25-6 RB RD</b>                       | 4000-7800             | <b>118811<sup>a</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b>                                | 256<br>262                                 | 284<br>290                                    | 106                           | 25 51<br>60 22                                | .020<br>.022                | .753<br>.753                  |
| Performance usage, bracket racing, good mid range torque & HP, Pro, Super Pro, etc., auto trans w/race converter, oval track, good mid range torque & HP, 1/4-3/8 mile, serious off road, 11.5 to 12.5 compress. ratio advised.  | <b>R-256/420-251-6</b>                             | 4000-7800             | <b>118821<sup>a</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b>                                | 256<br>264                                 | 288<br>296                                    | 106                           | 25 51<br>61 23                                | .020<br>.020                | .630<br>.630                  |
| Competition only, oval track, Sprint Car, tapped for Sander rear drive, for large roller bearing journals (1.9685"/50mm), 12.5 minimum compression ratio advised. Lift with 1.65:1 ratio rocker arms.  | <b>R-258/452-254-8 LRB RD SFO</b>                  | 4000-7800             | <b>118951<sup>a</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b>                                | 258<br>260                                 | 287<br>289                                    | 108                           | 26 52<br>63 17                                | .020<br>.022                | .746<br>.746                  |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Self-aligning rocker arms cannot be used with mechanical lifter roller camshafts.

**NOTE:** When using 55-56, 265 cu.in. blocks, late model cam bearings must be installed.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Many options are available for these camshafts, and any of our custom ground camshafts. An iron distributor drive gear and rear journal can be specified. Drilling and tapping for Sander rear drive is available. SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) and SF01 (1-8-7-2-6-5-4-3), or 4/7 3/2 swap, are offered. Optional journal sizes are Roller Bearing (1.875"), Big Block (1.949"), Large Roller Bearing/50mm (1.969"), and 55mm (2.165") Gun drilling (where applicable) is available. Lightweight undercut journal, narrow lobe cores are offered. Lobe layouts for Buick Race/Dart, Splayed Valve, and SB2 cylinder heads are available.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337  | See pg. 350   | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328  | See pg. 312       | See pg. 315                        | See pg. 317                                    |
|--------------------------------|--|---|-----------------------|--|--|--|-------------------|------------------------------------|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                      | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ENERGIZER | ROCKERS — GOLD RACE                            |
|                                | 96886-16 <sup>g,h</sup><br>96885-16 <sup>g,h</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>w</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>m</sup><br>99087-1 <sup>n</sup> | 11630-16 <sup>o</sup><br>95636-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> |                   |                                    | 11750-16 <sup>u</sup><br>11771-16 <sup>v</sup> |
|                                | 99893-16 <sup>g</sup><br>96870-16 <sup>g,i</sup>   | 99953-16<br>99943-16 <sup>l</sup>                                       | 99820-16 <sup>g</sup> | 99097-1 <sup>m</sup>                         | 11630-16 <sup>o</sup><br>95636-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> |                   | 11774-16 <sup>t</sup>              | 11750-16 <sup>u</sup><br>11771-16 <sup>v</sup> |
|                                | 99893-16 <sup>g</sup><br>96870-16 <sup>g,i</sup>   | 99953-16<br>99943-16 <sup>l</sup>                                       | 99820-16 <sup>g</sup> | 99097-1 <sup>m</sup>                         | 11630-16 <sup>o</sup><br>95636-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> |                   | 11774-16 <sup>t</sup>              | 11750-16 <sup>u</sup><br>11771-16 <sup>v</sup> |
|                                | 96886-16 <sup>g,h</sup><br>96885-16 <sup>g,h</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>w</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>m</sup><br>99087-1 <sup>n</sup> | 11630-16 <sup>o</sup><br>95636-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> |                   |                                    | 11750-16 <sup>u</sup><br>11771-16 <sup>v</sup> |
|                                | 96886-16 <sup>g,h</sup><br>96885-16 <sup>g,h</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>w</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>m</sup><br>99087-1 <sup>n</sup> | 11630-16 <sup>o</sup><br>95636-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> |                   |                                    | 11750-16 <sup>u</sup><br>11771-16 <sup>v</sup> |
|                                | 99893-16 <sup>g</sup><br>96870-16 <sup>g,i</sup>   | 99953-16<br>99943-16 <sup>l</sup>                                       | 99820-16 <sup>g</sup> | 99097-1 <sup>m</sup>                         | 11630-16 <sup>o</sup><br>95636-16 <sup>p</sup> | 11975-1 <sup>q</sup><br>11984-1 <sup>r</sup><br>11977-1 <sup>s</sup> |                   | 11774-16 <sup>t</sup>              | 11750-16 <sup>u</sup><br>11771-16 <sup>v</sup> |
|                                | 96886-16 <sup>g,h</sup><br>96885-16 <sup>g,h</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>w</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>m</sup><br>99087-1 <sup>n</sup> | 11630-16 <sup>o</sup><br>95636-16 <sup>p</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>s</sup>                         |                   |                                    | 11750-16 <sup>u</sup><br>11771-16 <sup>v</sup> |
|                                | 96886-16 <sup>g,h</sup><br>96885-16 <sup>g,h</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>w</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>m</sup><br>99087-1 <sup>n</sup> | 11630-16 <sup>o</sup><br>95636-16 <sup>p</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>s</sup>                         |                   |                                    | 11750-16 <sup>u</sup><br>11771-16 <sup>v</sup> |
|                                | 96886-16 <sup>g,h</sup><br>96885-16 <sup>g,h</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>w</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>m</sup><br>99087-1 <sup>n</sup> | 11630-16 <sup>o</sup><br>95636-16 <sup>p</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>s</sup>                         |                   |                                    | 11750-16 <sup>u</sup><br>11771-16 <sup>v</sup> |
|                                | 96886-16 <sup>g,h</sup><br>96885-16 <sup>g,h</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>w</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>m</sup><br>99087-1 <sup>n</sup> | 11630-16 <sup>o</sup><br>95636-16 <sup>p</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>s</sup>                         |                   |                                    | 11750-16 <sup>u</sup><br>11771-16 <sup>v</sup> |

**Section Continued**

- a Requires cam button spacer and a **11990-1** (.489" I.D.) or **11989-1** (.500" I.D. Accel) aluminum-bronze distributor drive gear. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b Requires cam button spacer, camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- c Camshaft has SFO firing order, with 4/7 swap.
- d Vertical locking bar roller lifters.
- e Ultra Pro Series vertical locking bar roller lifters.
- f Horizontal locking bar roller lifters.
- g Must machine cylinder heads.
- h For cylinder heads with +.100" long valves, use **99970-16** retainers and **99087-1** valve stem locks.
- i For cylinder heads with +.100" long valves, use **99943-16** retainers.
- j Titanium, must use **99097-1** valve stem locks, included with the retainers.
- k Requires Crane Multi Fit valve locks.
- l For cylinder heads with +.100" long valves.
- m Machined steel, heat treated.
- n Machined steel, heat treated, Multi Fit.
- o Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- p Pro Series one-piece, for use with or without pushrod guideplate cylinder heads.
- q Performance steel billet gears and roller chain set.
- r Pro Series steel billet gears and roller chain set.
- s Pro Series steel billet gears and roller chain set with thrust bearing.
- t Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- u 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- v 1.5 ratio, 7/16" stud (not self-aligning), Wide Body. Valve Train Stabilizer available, see page 363.
- w Titanium, for **96886-16** valve springs.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application  | Camshaft Series/<br>Grind Number                           | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code               | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|--|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| Rough idle, performance usage, good upper RPM HP, 388+ cu.in., Pro Street, bracket racing, auto trans w/3500+ converter, 4600-5000 cruise RPM, 12.0 minimum compression ratio advised.   | <b>SR-260/400-2S-8 IG</b>                                  | 4000-7600             | <b>118661<sup>a</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b> | 260  | 298   | 108                           | 27 53  | .020                        | .600                          |
|  |  |                       |  |  | 264  | 302   | 65 19                         | .022   | .600                        |                               |
| Performance usage, bracket racing, good mid to upper RPM torque and HP, Pro, Super Pro, etc., auto trans w/race converter, oval track, good mid to upper RPM torque and HP, 2-bbl or 4-bbl, 1/4-3/8 mile, 11.5 minimum compression ratio advised.                      | <b>R-260/420-2S2-6</b>                                     | 4200-8000             | <b>118831<sup>b</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b> | 260  | 292   | 106                           | 27 53  | .020                        | .630                          |
|  |  |                       |  |  | 264  | 296   | 61 23                         | .020   | .630                        |                               |
| Competition only, oval track, special for 360 Sprint Car, .950" base circle diameter, tapped for Sander rear drive, 12.5 minimum compression ratio advised.  | <b>294-304-08RRD.95</b>                                    | 4200-8200             | <b>19145<sup>b</sup></b>                                 | <b>11548-16<sup>g</sup></b><br><b>11570-16<sup>e</sup></b> | 260  | 294   | 108                           | 23 57  | .012                        | .670                          |
|  |  |                       |  |  | 266  | 304   | 62 24                         | .020   | .630                        |                               |
| Performance usage, bracket racing, good mid to upper RPM torque and HP, Pro, Super Pro, etc., auto trans w/race converter, oval track, 1/4-3/8 mile, .960" base circle diameter, 11.5 minimum compression ratio advised.   | <b>R-260/4467-2S-6.96</b><br><b>R-260/4467-2S-6.96 SFO</b> | 4200-8000             | <b>118411<sup>b</sup></b><br><b>118431<sup>b,c</sup></b> | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b> | 260  | 290   | 106                           | 26 54  | .012                        | .670                          |
|  |  |                       |  |  | 268  | 306   | 62 26                         | .022   | .625                        |                               |
| Performance usage, bracket racing, good mid to upper RPM torque and HP, Pro, Super Pro, etc., auto trans w/race converter, oval track, good mid to upper RPM torque and HP, 1/4-3/8 mile, 12.5 minimum compression ratio advised.                                      | <b>R-260/420-2-6</b><br><b>R-260/420-2-6 SFO</b>           | 4200-8000             | <b>118841<sup>b</sup></b><br><b>118931<sup>b,c</sup></b> | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b> | 260  | 292   | 106                           | 27 53  | .020                        | .630                          |
|  |  |                       |  |  | 270  | 302   | 64 26                         | .020   | .630                        |                               |
| Competition only, oval track, Sprint Car, Modified, Super Modified, 3/8-1/2 mile dirt or asphalt, 355-406 cu.in., .950" base circle diameter, tapped for Sander rear drive, 12.0 minimum compression ratio advised.  | <b>294-306-06 RRD.95</b>                                   | 4200-8000             | <b>19137<sup>b</sup></b>                                 | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b> | 260  | 294   | 106                           | 26 54  | .012                        | .670                          |
|  |  |                       |  |  | 270  | 306   | 63 27                         | .030   | .615                        |                               |
| Competition only, oval track, good mid range torque and HP, 2-bbl or 4-bbl, 1/4-3/8 mile, 9.0 compression restricted classes.  | <b>295-299-06R.98</b>                                      | 4200-7800             | <b>19128<sup>b</sup></b>                                 | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b> | 262  | 295   | 106                           | 27 55  | .012                        | .650                          |
|  |  |                       |  |  | 266  | 299   | 61 25                         | .012   | .650                        |                               |
| Competition only, oval track, for 410 Sprint Car and WOO, .950" base circle diameter, tapped for Sander rear drive, lightweight gun drilled core, for roller bearing (1.875") journals. Lift w/1.8:1 rocker arms.  | <b>383-431-08R.95 LWD RB RD</b>                            | 4400-8400             | <b>19146<sup>b</sup></b>                                 | <b>11570-16<sup>e</sup></b>                                | 264  | 294   | 108                           | 26 58  | .020                        | .770                          |
|  |  |                       |  |  | 268  | 298   | 64 24                         | .022   | .770                        |                               |
| Competition only, bracket racing, good mid to upper RPM HP, Super Pro, etc., auto trans w/race converter, oval track, 3/8-1/2 mile, 12.5 minimum compression ratio advised.  | <b>R-264/420-2S1-6</b>                                     | 4200-8000             | <b>118861<sup>b</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b> | 264  | 296   | 106                           | 29 55  | .020                        | .630                          |
|  |  |                       |  |  | 272  | 304   | 65 27                         | .020   | .630                        |                               |
| Competition only, w/large manifold nitrous system, good mid to upper RPM torque and HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised. Good w/Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised. | <b>R-264/420-2S1-10</b><br><b>R-264/420-2S1-10 SFO</b>     | 4200-8200             | <b>118921<sup>b</sup></b><br><b>118941<sup>b,c</sup></b> | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>e</sup></b> | 264  | 296   | 110                           | 26 58  | .020                        | .630                          |
|  |  |                       |  |  | 272  | 304   | 70 22                         | .020   | .630                        |                               |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Self-aligning rocker arms cannot be used with mechanical lifter roller camshafts.

**NOTE:** When using 55-56, 265 cu.in. blocks, late model cam bearings must be installed.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337  | See pg. 350   | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                                  | See pg. 312       | See pg. 315   | See pg. 317                                    |
|--------------------------------|--|---|-----------------------|--|--|--|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                      | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 99893-16 <sup>f</sup><br>96870-16 <sup>g,h</sup>   | 99953-16<br>99943-16 <sup>g</sup>                                       | 99820-16 <sup>e</sup> | 99097-1 <sup>i</sup>                         | 11630-16 <sup>n</sup><br>95636-16 <sup>o</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>q</sup> |                   | 11774-16 <sup>r</sup>                               | 11750-16 <sup>s</sup><br>11771-16 <sup>t</sup> |
|                                | 96886-16 <sup>f,i</sup><br>96885-16 <sup>f,i</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>u</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>m</sup> | 11630-16 <sup>n</sup><br>95636-16 <sup>o</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>q</sup> |                   |   | 11750-16 <sup>s</sup><br>11771-16 <sup>t</sup> |
|                                | 96886-16 <sup>f,i</sup><br>96885-16 <sup>f,i</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>u</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>m</sup> | 11630-16 <sup>n</sup><br>95636-16 <sup>o</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>q</sup> |                   |   | 11750-16 <sup>s</sup><br>11771-16 <sup>t</sup> |
|                                | 96886-16 <sup>f,i</sup><br>96885-16 <sup>f,i</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>u</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>m</sup> | 11630-16 <sup>n</sup><br>95636-16 <sup>o</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>q</sup> |                   |   | 11750-16 <sup>s</sup><br>11771-16 <sup>t</sup> |
|                                | 96886-16 <sup>f,i</sup><br>96885-16 <sup>f,i</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>u</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>m</sup> | 11630-16 <sup>n</sup><br>95636-16 <sup>o</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>q</sup> |                   |   | 11750-16 <sup>s</sup><br>11771-16 <sup>t</sup> |
|                                | 96886-16 <sup>f,i</sup><br>96885-16 <sup>f,i</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>u</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>m</sup> | 11630-16 <sup>n</sup><br>95636-16 <sup>o</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>q</sup> |                   |   | 11750-16 <sup>s</sup><br>11771-16 <sup>t</sup> |
|                                | 96886-16 <sup>f,i</sup><br>96885-16 <sup>f,i</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>u</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>m</sup> | 11630-16 <sup>n</sup><br>95636-16 <sup>o</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>q</sup> |                   |   | 11750-16 <sup>s</sup><br>11771-16 <sup>t</sup> |
|                                | 96886-16 <sup>f,i</sup><br>96885-16 <sup>f,i</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>u</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>m</sup> | 11630-16 <sup>n</sup><br>95636-16 <sup>o</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>q</sup> |                   |   | 11750-16 <sup>s</sup><br>11771-16 <sup>t</sup> |
|                                | 96886-16 <sup>f,i</sup><br>96885-16 <sup>f,i</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>u</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>m</sup> | 11630-16 <sup>n</sup><br>95636-16 <sup>o</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>q</sup> |                   |   | 11750-16 <sup>s</sup><br>11771-16 <sup>t</sup> |
|                                | 96886-16 <sup>f,i</sup><br>96885-16 <sup>f,i</sup> | 99970-16 <sup>k</sup><br>99659-16 <sup>u</sup><br>99675-16 <sup>j</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>m</sup> | 11630-16 <sup>n</sup><br>95636-16 <sup>o</sup> | 11984-1 <sup>r</sup><br>11977-1 <sup>q</sup> |                   |   | 11750-16 <sup>s</sup><br>11771-16 <sup>t</sup> |

Section Continued

- a Requires cam button spacer, camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b Requires cam button spacer and a **11990-1** (.489" I.D.) or **11989-1** (.500" I.D. Accel) aluminum-bronze distributor drive gear. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- c Camshaft has SFO firing order, with 4/7 swap.
- d Vertical locking bar roller lifters.
- e Ultra Pro Series vertical locking bar roller lifters.
- f Must machine cylinder heads.
- g For cylinder heads with +.100" long valves, use **99943-16** retainers.
- h For cylinder heads with +.100" long valves.
- i For cylinder heads with +.100" long valves, use **99970-16** retainers and **99087-1** valve stem locks.
- j Titanium, must use **99097-1** valve stem locks, included with the retainers.
- k Requires Crane Multi Fit valve locks.
- l Machined steel, heat treated.
- m Machined steel, heat treated, Multi Fit.
- n Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- o Pro Series one piece, for use with or without pushrod guideplate cylinder heads.
- p Pro Series steel billet gears and roller chain set.
- q Pro Series steel billet gears and roller chain set with thrust bearing.
- r Crane Classic extruded, 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- s 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- t 1.5 ratio, 7/16" stud (not self-aligning), Wide Body. Valve Train Stabilizer available, see page 363.
- u Titanium, for **96886-16** valve springs.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application  | Camshaft Series/<br>Grind Number                           | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code               | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|--|--|-----------------------|--|--|--|---|-------------------------------|--|---------------------|-----------------------|
| <b>Mechanical RollerCamshafts</b>  |  |                       |  |  |  |   |                               |  |                     |                       |
| Competition only, oval track, Sprint Car, Modified, Super Modified, 1/2-5/8 mile dirt or asphalt, 355-406 cu.in., .950" base circle diameter, tapped for Sander rear drive, 12.5 minimum compression ratio advised.  | <b>298-311-06RRD.95</b>                                    | 4400-8000             | <b>19139<sup>a</sup></b>                                 | <b>11570-16<sup>c</sup></b>                                | 264<br>273                                 | 298<br>311                                    | 106                           | 27 57<br>64.5 28.5                           | .012<br>.030        | .670<br>.615          |
| Competition only, oval track, for 410 Sprint Car and W00, tapped for Sander rear drive, for roller bearing (1.875") journals. Lift w/1.7:1 rocker arms.  | <b>R-264/4381-2S-8 RB RD</b>                               | 4400-8000             | <b>118771<sup>a</sup></b>                                | <b>11570-16<sup>c</sup></b>                                | 264<br>268                                 | 296<br>300                                    | 108                           | 26 58<br>66 22                               | .020<br>.022        | .745<br>.745          |
| Competition only, oval track, for 410 Sprint Car and W00, tapped for Sander rear drive, lightweight gun drilled core, for 55mm journals. Lift w/1.7:1 rocker arms.   | <b>R-264/4381-2S-8LWDRD 55J</b>                            | 4400-8000             | <b>118781<sup>a</sup></b>                                | <b>11570-16<sup>c</sup></b>                                | 264<br>268                                 | 296<br>300                                    | 108                           | 26 58<br>66 22                               | .020<br>.022        | .745<br>.745          |
| Competition only, bracket racing, good upper RPM HP, Super Pro, etc., auto trans w/race converter, oval track, 2-bbl or 4-bbl, 3/8-1/2 mile, 12.5 minimum compression ratio advised.   | <b>R-268/420-2S1-7</b>                                     | 4600-8200             | <b>118871<sup>a</sup></b>                                | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>c</sup></b> | 268<br>272                                 | 300<br>304                                    | 107                           | 30 58<br>66 26                               | .020<br>.020        | .630<br>.630          |
| Competition only, bracket racing, good mid to upper RPM torque and HP, Super Pro, Super Gas, etc., auto trans w/race converter, .960" base circle diameter, 12.5 minimum compression ratio advised.  | <b>R-268/4467-2S-6.96</b><br><b>R-268/4467-2S-6.96 SFO</b> | 4400-8200             | <b>118421<sup>a</sup></b><br><b>118441<sup>a,b</sup></b> | <b>11519-16<sup>d</sup></b><br><b>11570-16<sup>c</sup></b> | 268<br>276                                 | 298<br>314                                    | 106                           | 31 57<br>67 29                               | .012<br>.022        | .670<br>.625          |
| Competition only, bracket racing, good mid to upper RPM torque and HP, Super Pro, Super Gas, etc., auto trans w/race converter, 12.5 minimum compression ratio advised. Lift with 1.65:1 rocker arms.  | <b>R-268/452-2S-7</b>                                      | 4400-8200             | <b>118791<sup>a</sup></b>                                | <b>11570-16<sup>c</sup></b>                                | 268<br>272                                 | 297<br>301                                    | 107                           | 31 57<br>67 25                               | .020<br>.022        | .746<br>.746          |
| Competition only, bracket racing, good mid to upper RPM torque and HP, Super Pro, Super Gas, etc., auto trans w/race converter, 12.5 minimum compression ratio advised.  | <b>R-270/420-2S8-6</b>                                     | 4400-8200             | <b>118881<sup>a</sup></b>                                | <b>11570-16<sup>c</sup></b>                                | 270<br>276                                 | 302<br>308                                    | 106                           | 32 58<br>67 29                               | .020<br>.020        | .630<br>.630          |
| Competition only, good w/large manifold nitrous system, good upper RPM torque and HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised. Good w/large Roots supercharger, 24 lbs. maximum boost w/8.0 maximum compression ratio advised. | <b>R-272/4334-2S2-10</b><br><b>R-272/4334-2S2-10 SFO</b>   | 4400-8200             | <b>118321<sup>a</sup></b><br><b>118331<sup>a,b</sup></b> | <b>11570-16<sup>c</sup></b>                                | 272<br>282                                 | 312<br>322                                    | 110                           | 29 63<br>74 28                               | .026<br>.026        | .650<br>.641          |
| Competition only, drag racing, Super Stock, 350 cu.in., auto transmission w/race converter, lift with 1.8 intake, 1.6 exhaust rockers.   | <b>R-272/428-2S-6 SFO</b>                                  | 4600-8200             | <b>118291<sup>a,b</sup></b>                              | <b>11570-16<sup>c</sup></b>                                | 272<br>280                                 | 302<br>310                                    | 106                           | 34 58<br>69 31                               | .020<br>.014        | .770<br>.715          |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Self-aligning rocker arms cannot be used with mechanical lifter roller camshafts.

**NOTE:** When using 55-56, 265 cu.in. blocks, late model cam bearings must be installed.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Many options are available for these camshafts, and any of our custom ground camshafts. An iron distributor drive gear and rear journal can be specified. Drilling and tapping for Sander rear drive is available. SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) and SF01 (1-8-7-2-6-5-4-3), or 4/7 3/2 swap, are offered. Optional journal sizes are Roller Bearing (1.875"), Big Block (1.949"), Large Roller Bearing/50mm (1.969"), and 55mm (2.165") Gun drilling (where applicable) is available. Lightweight undercut journal, narrow lobe cores are offered. Lobe layouts for Buick Race/Dart, Splayed Valve, and SB2 cylinder heads are available.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                    | See pg. 350   | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                                    | See pg. 312                                  | See pg. 315   | See pg. 317                                    |
|--------------------------------|--|---|-----------------------|--|--|--|--|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                  | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                 | STEEL ROCKER ARMS                            | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 96886-16 <sup>g</sup><br>96885-16 <sup>g</sup> | 99970-16 <sup>i</sup><br>99659-16 <sup>f</sup><br>99675-16 <sup>h</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup>   |  |   | 11750-16 <sup>p</sup><br>11771-16 <sup>q</sup> |
|                                | 96886-16 <sup>g</sup><br>96885-16 <sup>g</sup> | 99970-16 <sup>i</sup><br>99659-16 <sup>f</sup><br>99675-16 <sup>h</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup>   |  |   | 11750-16 <sup>p</sup><br>11771-16 <sup>q</sup> |
|                                | 96886-16 <sup>g</sup><br>96885-16 <sup>g</sup> | 99970-16 <sup>i</sup><br>99659-16 <sup>f</sup><br>99675-16 <sup>h</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup>   |  |   | 11750-16 <sup>p</sup><br>11771-16 <sup>q</sup> |
|                                | 96886-16 <sup>g</sup><br>96885-16 <sup>g</sup> | 99970-16 <sup>i</sup><br>99659-16 <sup>f</sup><br>99675-16 <sup>h</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup>   |  |   | 11750-16 <sup>p</sup><br>11771-16 <sup>q</sup> |
|                                | 96886-16 <sup>g</sup><br>96885-16 <sup>g</sup> | 99970-16 <sup>i</sup><br>99659-16 <sup>f</sup><br>99675-16 <sup>h</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup>   |  |   | 11750-16 <sup>p</sup><br>11771-16 <sup>q</sup> |
|                                | 96886-16 <sup>g</sup><br>96885-16 <sup>g</sup> | 99970-16 <sup>i</sup><br>99659-16 <sup>f</sup><br>99675-16 <sup>h</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup>   |  |   | 11750-16 <sup>p</sup><br>11771-16 <sup>q</sup> |
|                                |  | 99980-16 <sup>e,f</sup>   | 99675-16 <sup>h</sup> | 99820-16 <sup>e</sup>                        | 99097-1 <sup>j</sup>                           | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |   | 11750-16 <sup>p</sup><br>11771-16 <sup>q</sup> |
|                                | 99880-16 <sup>e,f</sup>                        | 99675-16 <sup>h</sup>   | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup>                         | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup>   |  |   | 11750-16 <sup>p</sup><br>11771-16 <sup>q</sup> |

Section Continued

- a** Requires cam button spacer and a **11990-1** (.489" I.D.) or **11989-1** (.500" I.D. Accel) aluminum-bronze distributor drive gear. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b** Camshaft has SFO firing order, with 4/7 swap.
- c** Ultra Pro Series vertical locking bar roller lifters.
- d** Vertical locking bar roller lifters.
- e** Must machine cylinder heads.
- f** For cylinder heads with +.100" long valves.
- g** For cylinder heads with +.100" long valves, use **99970-16** retainers and **99087-1** valve stem locks.
- h** Titanium, must use **99097-1** valve stem locks, included with the retainers.
- i** Requires Crane Multi Fit valve locks.
- j** Machined steel, heat treated.
- k** Machined steel, heat treated, Multi Fit.
- l** Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- m** Pro Series one piece, for use with or without pushrod guideplate cylinder heads.
- n** Pro Series steel billet gears and roller chain set.
- o** Pro Series steel billet gears and roller chain set with thrust bearing.
- p** 1.5 ratio, 3/8" stud (not self-aligning). Valve Train Stabilizer available, see page 363.
- q** 1.5 ratio, 7/16" stud (not self-aligning), Wide Body. Valve Train Stabilizer available, see page 363.
- r** Titanium, for **96886-16** valve springs.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number                         | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code               | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|--|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b>  |  |                       |  |  |  |   |                               |  |                             |                               |
| Competition only, good upper RPM torque and HP, bracket racing, 360+ cu.in., .900" base circle diameter, auto trans w/race converter, 12.5 minimum compression ratio advised.   | <b>R-274/4541-2S-6.90</b>                                | 4600-8200             | <b>118801<sup>a</sup></b>                                | <b>11570-16<sup>c</sup></b>                                | 274<br>282                                 | 305<br>313                                    | 106                           | 35 59<br>71 31                               | .020<br>.022                | .681<br>.681                  |
| Competition only, bracket racing, good upper RPM HP, Super Pro, Super Gas, etc., auto transmission w/race converter, 12.5 minimum compression ratio advised.  | <b>R-276/420-2S1-6</b>                                   | 4600-8400             | <b>118891<sup>a</sup></b>                                | <b>11570-16<sup>c</sup></b>                                | 276<br>284                                 | 308<br>316                                    | 106                           | 35 61<br>71 33                               | .020<br>.020                | .630<br>.630                  |
| Competition only, high RPM maximum performance applications, Super Stock/Competition Eliminator, 292-340 cu.in., etc., stick or auto transmission w/race converter, for 55mm journals, 14.0 minimum compression ratio advised. Lift w/1.8:1 intake rocker arms.   | <b>R-276/5152-2S-14 SFO 55J</b>                          | 6000-9800             | <b>118991<sup>a,b</sup></b>                              | <b>11570-16<sup>c</sup></b><br><b>11574-16<sup>d</sup></b> | 276<br>292                                 | 306<br>326                                    | 114                           | 29 67<br>83 29                               | .020<br>.026                | .927<br>.720                  |
| Competition only, drag racing, Super Stock, 350 cu.in., auto transmission w/race converter, lift with 1.65:1 rocker arms.   | <b>R-278/452-2S2-6 SFO</b>                               | 4800-8400             | <b>118961<sup>a,b</sup></b>                              | <b>11570-16<sup>c</sup></b><br><b>11574-16<sup>d</sup></b> | 278<br>284                                 | 307<br>313                                    | 106                           | 37 61<br>72 32                               | .020<br>.022                | .746<br>.746                  |
| Competition only, bracket racing, good upper RPM HP, Super Quick, Super Comp, etc., auto transmission w/race converter, 12.5 minimum compression ratio advised.   | <b>R-280/420-2S-8</b>                                    | 5000-8600             | <b>118901<sup>a</sup></b>                                | <b>11570-16<sup>c</sup></b>                                | 280<br>284                                 | 312<br>316                                    | 108                           | 36 64<br>74 30                               | .020<br>.020                | .630<br>.630                  |
| Competition only, good upper RPM HP, Super Stock, Super Quick, stick or auto transmission w/race converter, 12.5 minimum compression ratio advised.   | <b>R-280/450-2S-8</b>                                    | 5000-8600             | <b>118361<sup>a</sup></b>                                | <b>11570-16<sup>c</sup></b><br><b>11574-16<sup>d</sup></b> | 280<br>284                                 | 320<br>324                                    | 108                           | 35 65<br>73 31                               | .026<br>.026                | .675<br>.641                  |
| Competition only, 370+ cu.in., Super Quick, etc., stick or auto transmission w/race converter, good w/large multi-stage nitrous system, 13.0 minimum compression ratio advised. Good w/large Roots supercharger, 30 lbs. maximum boost w/8.0 maximum compression ratio advised.   | <b>R-282/4765-2S2-10</b>                                 | 5000-8600             | <b>118381<sup>a</sup></b>                                | <b>11570-16<sup>c</sup></b><br><b>11574-16<sup>d</sup></b> | 282<br>290                                 | 316<br>324                                    | 110                           | 36 66<br>80 30                               | .035<br>.030                | .715<br>.688                  |
| Competition only, high RPM maximum performance applications, Competition Eliminator, 292-340 cu.in., etc., Super Quick w/400+ cu.in., stick or auto transmission w/race converter, 14.0 minimum compression ratio advised. Lift w/1.65 rocker arms.   | <b>R-282/4765-2S2-12</b><br><b>R-282/4765-2S2-12 SFO</b> | 6000-9400             | <b>118451<sup>a</sup></b><br><b>118461<sup>a,b</sup></b> | <b>11570-16<sup>c</sup></b><br><b>11574-16<sup>d</sup></b> | 282<br>290                                 | 316<br>324                                    | 112                           | 34 68<br>82 28                               | .035<br>.030                | .786<br>.757                  |
| Competition only, high RPM Competition Eliminator, stick or auto transmission w/race converter, 14.0 minimum compression ratio advised. Lift w/1.65 rocker arms.  | <b>R-282/5002-2S-13 SFO</b>                              | 6000-9600             | <b>118491<sup>a,b</sup></b>                              | <b>11570-16<sup>c</sup></b><br><b>11574-16<sup>d</sup></b> | 282<br>290                                 | 312<br>330                                    | 113                           | 33 69<br>83 27                               | .020<br>.030                | .825<br>.776                  |
| Competition only, high RPM maximum performance applications, good w/large multi-stage nitrous system, 388+ cu.in., Super Quick, etc., stick or auto transmission w/race converter, 14.0 minimum compression ratio advised. Good w/large Roots supercharger, 388+ cu.in., 35 lbs. maximum boost with 7.5 maximum compression ratio advised. Lift w/1.65 rocker arms. | <b>R-286/4765-2S3-12</b><br><b>R-286/4765-2S3-12 SFO</b> | 6000-9800             | <b>118471<sup>a</sup></b><br><b>118481<sup>a,b</sup></b> | <b>11570-16<sup>c</sup></b><br><b>11574-16<sup>d</sup></b> | 286<br>294                                 | 320<br>328                                    | 112                           | 36 70<br>84 30                               | .035<br>.030                | .786<br>.757                  |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Self-aligning rocker arms cannot be used with mechanical lifter roller camshafts.

**NOTE:** When using 55-56, 265 cu.in. blocks, late model cam bearings must be installed.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

**NOTE:** Many options are available for these camshafts, and any of our custom ground camshafts. An iron distributor drive gear and rear journal can be specified. Drilling and tapping for Sander rear drive is available. SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap) and SF01 (1-8-7-2-6-5-4-3), or 4/7 3/2 swap, are offered. Optional journal sizes are Roller Bearing (1.875"), Big Block (1.949"), Large Roller Bearing/50mm (1.969"), and 55mm (2.165") Gun drilling (where applicable) is available. Lightweight undercut journal, narrow lobe cores are offered. Lobe layouts for Buick Race/Dart, Splayed Valve, and SB2 cylinder heads are available.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                      | See pg. 350  | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                                  | See pg. 312       | See pg. 315   | See pg. 317                                    |
|--------------------------------|--|--|-----------------------|--|--|--|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                    | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 99880-16 <sup>ef</sup>                           | 99675-16 <sup>b</sup>                                      | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |                   |   | 11771-16 <sup>p</sup>                          |
|                                | 99885-16 <sup>ef</sup><br>96883-16 <sup>eg</sup> | 99956-16<br>99675-16 <sup>b</sup><br>99970-16 <sup>i</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |                   |   | 11750-16 <sup>q</sup><br>11771-16 <sup>p</sup> |
|                                | 99885-16 <sup>ef</sup><br>96883-16 <sup>eg</sup> | 99956-16<br>99675-16 <sup>b</sup><br>99970-16 <sup>i</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 95636-16 <sup>m</sup>                          | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |                   |   | 11771-16 <sup>p</sup>                          |
|                                | 99885-16 <sup>ef</sup><br>96883-16 <sup>eg</sup> | 99956-16<br>99675-16 <sup>b</sup><br>99970-16 <sup>i</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |                   |   | 11771-16 <sup>p</sup>                          |
|                                | 99885-16 <sup>ef</sup><br>96883-16 <sup>eg</sup> | 99956-16<br>99675-16 <sup>b</sup><br>99970-16 <sup>i</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99087-1 <sup>k</sup> | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |                   |   | 11750-16 <sup>q</sup><br>11771-16 <sup>p</sup> |
|                                | 99880-16 <sup>ef</sup>                           | 99675-16 <sup>b</sup>                                      | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup>                         | 11630-16 <sup>l</sup><br>95636-16 <sup>m</sup> | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |                   |   | 11771-16 <sup>p</sup>                          |
|                                | 99880-16 <sup>ef</sup>                           | 99675-16 <sup>b</sup>                                      | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup>                         | 95636-16 <sup>m</sup>                          | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |                   |   | 11771-16 <sup>p</sup>                          |
|                                | 99880-16 <sup>ef</sup>                           | 99675-16 <sup>b</sup>                                      | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup>                         | 95636-16 <sup>m</sup>                          | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |                   |   | 11771-16 <sup>p</sup>                          |
|                                | 99880-16 <sup>ef</sup>                           | 99675-16 <sup>b</sup>                                      | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup>                         | 95636-16 <sup>m</sup>                          | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |                   |   | 11771-16 <sup>p</sup>                          |
|                                | 99880-16 <sup>ef</sup>                           | 99675-16 <sup>b</sup>                                      | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup>                         | 95636-16 <sup>m</sup>                          | 11984-1 <sup>n</sup><br>11977-1 <sup>o</sup> |                   |   | 11771-16 <sup>p</sup>                          |

- a Requires cam button spacer and a **11990-1** (.489" I.D.) or **11989-1** (.500" I.D. Accel) aluminum-bronze distributor drive gear. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b Camshaft has SFO firing order, with 4/7 swap.
- c Ultra Pro Series vertical locking bar roller lifters.
- d Ultra Pro Series vertical locking bar roller lifters for .904" diameter lifter bores.
- e Must machine cylinder heads.
- f For cylinder heads with +.100" long valves.
- g For cylinder heads with +.100" long valves, use **99970-16** retainers and **99087-1** valve stem locks.
- h Titanium, must use **99097-1** valve stem locks, included with the retainers.
- i Requires Crane Multi Fit valve locks.
- j Machined steel, heat treated.
- k Machined steel, heat treated, Multi Fit.
- l Heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- m Pro Series one-piece, for use with or without pushrod guideplate cylinder heads.
- n Pro Series steel billet gears and roller chain set.
- o Pro Series steel billet gears and roller chain set with thrust bearing.
- p 1.5 ratio, 7/16" stud (not self-aligning), Wide Body Valve Train Stabilizer available, see page 363.
- q 1.5 ratio, 3/8" stud (not self-aligning), Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b>   |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| For low-end and mid-range performance in 87-92 cars and light trucks. Fine w/auto or manual and stock rear gears, great for 305 requiring extra low-end torque to cruise below 1800 RPM, ideal for TBI engines w/auto trans and stock converter. (50 state legal for listed applications, C.A.R.B. E.O. D-225-22).  | 2010                             | 500-4200              | 104201                                     | 10530-16 <sup>a</sup> | 184<br>194                                 | 246<br>256                                    | 106                           | (14) 18<br>23 9                              | .000<br>.000                | .384<br>.407                  |
| Designed for TPI 305 engines in 87-89 Camaros and Firebirds w/auto trans. Good all-around performance. The use of Adjustable Fuel Pressure Regulator (99470-1) is recommended for maximum performance. (50 state legal for listed applications, C.A.R.B. E.O. D-225-22).  | 2011                             | 500-4400              | 104204                                     | 10530-16 <sup>a</sup> | 184<br>204                                 | 246<br>266                                    | 108                           | (11) 15<br>35 (11)                           | .000<br>.000                | .384<br>.429                  |
| For mid and top end torque and HP. Mainly for 87-92 305 cars w/TBI and manual 4 or 5-speed. (50 state legal for listed applications, C.A.R.B. E.O. D-225-22).   | 2020                             | 800-4600              | 104211                                     | 10530-16 <sup>a</sup> | 194<br>204                                 | 256<br>266                                    | 111                           | (14) 28<br>33 (9)                            | .000<br>.000                | .407<br>.429                  |
| Builds mid and upper RPM performance in 87 TPI engines with 5-speed transmission and all rear gear ratios. Also fits 88-89 305 engines w/5-speed and 2.73 or 3.27 rear gears for mid-range performance. Adjustable Fuel Pressure Regulator (99470-1) recommended for maximum performance. (50 state legal for listed applications, C.A.R.B. E.O. D-225-22). | 2030                             | 1200-5200             | 104221                                     | 10530-16 <sup>a</sup> | 204<br>214                                 | 260<br>270                                    | 116                           | (14) 38<br>43 9                              | .000<br>.000                | .429<br>.452                  |
| For mid & upper RPM performance in 88-89 305 engines w/5-speed and 3.45 or numerically higher rear gear ratios. Adjustable Fuel Pressure Regulator (99470-1) is recommended for maximum performance. (50 state legal for listed applications, C.A.R.B. E.O. D-225-22).  | 2031                             | 1400-5400             | 104225                                     | 10530-16 <sup>a</sup> | 208<br>214                                 | 264<br>270                                    | 112                           | (3) 31<br>44 (10)                            | .000<br>.000                | .438<br>.452                  |
| For 87-89 Corvettes, Camaros and Firebirds factory equipped w/350 TPI engines. Adjustable Fuel Pressure Regulator (99470-1) is recommended for maximum performance. (50 state legal for listed applications, C.A.R.B. E.O. D-225-22).   | 2032                             | 1800-5800             | 104224                                     | 10530-16 <sup>a</sup> | 214<br>220                                 | 270<br>276                                    | 112                           | 0 34<br>47 (7)                               | .000<br>.000                | .452<br>.465                  |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel, it is HIGHLY RECOMMENDED that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** The camshafts listed above incorporate the front ignition drive pilot hole for late model applications. A long cam dowel pin is installed, which can be driven in further when required for short dowel pin application engines.

**NOTE:** Mechanical roller tappet camshafts and components are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.



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**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>                              | <i>See pg. 350</i> | <i>See pg. 362</i> | <i>See pg. 360</i>   | <i>See pg. 306</i>                             | <i>See pg. 328</i>             | <i>See pg. 312</i>   | <i>See pg. 315</i>                                  | <i>See pg. 317</i>   |
|--------------------------------|---|--------------------|--------------------|----------------------|--|--------------------------------|--|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                   | RETAINERS          | VALVE STEM SEALS   | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
| 11308-1 <sup>b</sup>           | 99848-16 <sup>b</sup><br>144846-16 <sup>f</sup> | 99915-16           |                    | 99097-1 <sup>d</sup> | 10621-16 <sup>e</sup><br>95624-16 <sup>f</sup> | 10975-1 <sup>g</sup>           | 11801-16 <sup>h,i</sup><br>11806-16 <sup>j,i</sup><br>10800C-16 <sup>k</sup> | 11774-16 <sup>l,i</sup><br>11744-16 <sup>m,i</sup>  | 11750-16 <sup>n,i</sup><br>10750-16 <sup>o,i</sup><br>10751-16 <sup>p</sup><br>10758-16 <sup>q</sup> |
| 11308-1 <sup>b</sup>           | 99848-16 <sup>b</sup><br>144846-16 <sup>f</sup> | 99915-16           |                    | 99097-1 <sup>d</sup> | 10621-16 <sup>e</sup><br>95624-16 <sup>f</sup> | 10975-1 <sup>g</sup>           | 11801-16 <sup>h,i</sup><br>11806-16 <sup>j,i</sup><br>10800C-16 <sup>k</sup> | 11774-16 <sup>l,i</sup><br>11744-16 <sup>m,i</sup>  | 11750-16 <sup>n,i</sup><br>10750-16 <sup>o,i</sup><br>10751-16 <sup>p</sup><br>10758-16 <sup>q</sup> |
| 11308-1 <sup>b</sup>           | 99848-16 <sup>b</sup><br>144846-16 <sup>f</sup> | 99915-16           |                    | 99097-1 <sup>d</sup> | 10621-16 <sup>e</sup><br>95624-16 <sup>f</sup> | 10975-1 <sup>g</sup>           | 11801-16 <sup>h,i</sup><br>11806-16 <sup>j,i</sup><br>10800C-16 <sup>k</sup> | 11774-16 <sup>l,i</sup><br>11744-16 <sup>m,i</sup>  | 11750-16 <sup>n,i</sup><br>10750-16 <sup>o,i</sup><br>10751-16 <sup>p</sup><br>10758-16 <sup>q</sup> |
|                                | 96802-16 <sup>c</sup><br>144846-16 <sup>f</sup> | 99915-16           |                    | 99097-1 <sup>d</sup> | 10621-16 <sup>e</sup><br>95624-16 <sup>f</sup> | 10975-1 <sup>g</sup>           | 11801-16 <sup>h,i</sup><br>11806-16 <sup>j,i</sup><br>10800C-16 <sup>k</sup> | 11774-16 <sup>l,i</sup><br>11744-16 <sup>m,i</sup>  | 11750-16 <sup>n,i</sup><br>10750-16 <sup>o,i</sup><br>10751-16 <sup>p</sup><br>10758-16 <sup>q</sup> |
|                                | 96802-16 <sup>c</sup><br>144846-16 <sup>f</sup> | 99915-16           |                    | 99097-1 <sup>d</sup> | 10621-16 <sup>e</sup><br>95624-16 <sup>f</sup> | 10975-1 <sup>g</sup>           | 11801-16 <sup>h,i</sup><br>11806-16 <sup>j,i</sup><br>10800C-16 <sup>k</sup> | 11774-16 <sup>l,i</sup><br>11744-16 <sup>m,i</sup>  | 11750-16 <sup>n,i</sup><br>10750-16 <sup>o,i</sup><br>10751-16 <sup>p</sup><br>10758-16 <sup>q</sup> |
|                                | 96802-16 <sup>c</sup><br>144846-16 <sup>f</sup> | 99915-16           |                    | 99097-1 <sup>d</sup> | 10621-16 <sup>e</sup><br>95624-16 <sup>f</sup> | 10975-1 <sup>g</sup>           | 11801-16 <sup>h,i</sup><br>11806-16 <sup>j,i</sup><br>10800C-16 <sup>k</sup> | 11774-16 <sup>l,i</sup><br>11744-16 <sup>m,i</sup>  | 11750-16 <sup>n,i</sup><br>10750-16 <sup>o,i</sup><br>10751-16 <sup>p</sup><br>10758-16 <sup>q</sup> |

- a For use with standard GM alignment bars.
- b Contains standard diameter valve springs, no machining required.
- c Standard diameter valve springs, for 1.750" assembly height.
- d Machined steel, heat treated.
- e Heavy wall, heat treated, for use with either pushrod guideplate or non-guideplate cylinder heads.
- f Pro Series, one-piece
- g Performance steel billet gears and roller chain set, for 1987-91 applications.
- h 1.5 ratio, extra long slot (not self-aligning).
- i In order to use these rocker arms on engines originally equipped with self-aligning rockers, hardened pushrod guideplates must be installed, and valve cover clearance checked.
- j 1.5 ratio, roller tip, extra long slot (not self-aligning).
- k 1.5 ratio, self-aligning, Nitro Carb.
- l Crane Classic extruded, 1.5 ratio (not self-aligning). Factory cast valve covers may require internal clearancing.
- m Energizer, 1.5 ratio (not self-aligning). Will not have sufficient clearance in factory cast valve covers.
- n 1.5 ratio (not self-aligning). Factory cast valve covers may require internal clearancing.
- o 1.5 ratio (not self-aligning), narrow body for center bolt valve covers.
- p 1.5 ratio, self-aligning narrow body for center bolt valve covers.
- q 1.6 ratio, self-aligning narrow body for center bolt valve covers.
- r Standard diameter PAC Enhanced valve springs for 1.750" assembly height.

### COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b><br>Brute low end torque and HP, smooth idle, daily usage, light towing, economy, also mild turbocharged, 2200-3000 cruise RPM, marine applications: primarily used in 350 cu.in. near-stock engines for mild performance applications in heavy boats, 8.0 to 9.5 compression ratio advised.   | <b>HR-260-2-12 IG</b>            | 1000-5200             | <b>109811<sup>a</sup></b>                  | <b>10530-16<sup>b</sup></b><br><b>10535-16<sup>c</sup></b> | 204  | 260   | 112                           | (5) 29                                       | .000                        | .429                          |
|   |                                  |                       |  |  | 214  | 270   |                               | 44 (10)                                      | .000                        | .452                          |
| Brute low end torque and HP, smooth idle, daily usage, light towing, economy, also mild turbocharged, primarily used in 383+ cu.in. engines, 2200-3000 cruise RPM, marine applications: use for mild performance applications in heavy boats, 8.0 to 9.5 compression ratio advised, .900" base circle for long stroke clearance.  | <b>HR-206/319-2S-12.90 IG</b>    | 1000-5200             | <b>109851<sup>a</sup></b>                  | <b>10535-16<sup>c</sup></b>                                | 206  | 268   | 112                           | (4) 30                                       | .000                        | .479                          |
|   |                                  |                       |  |  | 214  | 276   |                               | 44 (10)                                      | .000                        | .498                          |
| Excellent low end and mid range torque and HP, good idle, daily usage, off road, performance and fuel efficiency, 2600-3400 cruise RPM, marine applications: primarily used in 350 cu.in. mildly modified engines with high flow exhaust systems, for performance applications in light boats, 8.75 to 10.75 compression ratio advised. Good w/small supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised.  | <b>HR-276-2S-12 IG</b>           | 1600-5800             | <b>109821<sup>a</sup></b>                  | <b>10530-16<sup>b</sup></b><br><b>10535-16<sup>c</sup></b> | 214  | 276   | 112                           | 0 34   | .000                        | .488                          |
|   |                                  |                       |  |  | 222  | 284   |                               | 48 (6)                                       | .000                        | .509                          |
| Excellent low end and mid range torque and HP, good idle, daily usage, off road, performance and fuel efficiency, primarily used in 383+ cu.in. engines, 2600-3400 cruise RPM, marine applications: for mildly modified engines with high flow exhaust systems, for performance applications in light boats, 8.75 to 10.75 compression ratio advised. Good w/small supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised, .900" base circle for long stroke clearance. | <b>HR-216/339-2S-12.90 IG</b>    | 1600-5800             | <b>109671<sup>a</sup></b>                  | <b>10535-16<sup>c</sup></b>                                | 216  | 284   | 112                           | 1 35   | .000                        | .509                          |
|   |                                  |                       |  |  | 224  | 292   |                               | 49 (5)                                       | .000                        | .528                          |
| Excellent mid range torque and HP, good idle, moderate performance usage, crate motor upgrade, mild bracket racing, auto trans w/2000+ converter, marine applications: for 350 cu.in. modified engines with free-flowing above water exhaust systems for performance applications in light pleasure and ski boats, including jet boats, 2800-3600 cruise RPM, 9.0 to 11.0 compression ratio advised. Good w/supercharger, 10 lbs. maximum boost w/8.0 maximum compression ratio advised.    | <b>HR-218/332-2S3-12 IG</b>      | 1800-6000             | <b>109861<sup>a</sup></b>                  | <b>10535-16<sup>c</sup></b>                                | 218  | 280   | 112                           | 2 36   | .000                        | .498                          |
|   |                                  |                       |  |  | 226  | 288   |                               | 50 (4)                                       | .000                        | .518                          |
| Good mid range torque and HP, fair idle, moderate performance usage, crate motor upgrade, mild bracket racing, auto trans w/2500+ converter, marine applications: for 350+ cu.in. modified engines with free-flowing above water exhaust systems for performance applications in light pleasure and ski boats, including jet boats, 3000-3800 cruise RPM, 9.5 to 11.0 compression ratio advised. Good w/supercharger, 10 lbs. maximum boost w/8.0 maximum compression ratio advised.        | <b>HR-284-2S-12 IG</b>           | 2000-6200             | <b>109831<sup>a</sup></b>                  | <b>10535-16<sup>c</sup></b>                                | 222  | 284   | 112                           | 4 38   | .000                        | .509                          |
|   |                                  |                       |  |  | 230  | 292   |                               | 52 (2)                                       | .000                        | .528                          |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel, it is HIGHLY RECOMMENDED that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** The camshafts listed above incorporate the front ignition drive pilot hole for late model applications. A long cam dowel pin is installed, which can be driven in further when required for short dowel pin application engines.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

Since 1975, General Motors divisions have exchanged engines

throughout different models. Be certain of exactly which engine you have before ordering.

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**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>                               | <i>See pg. 337</i>   | <i>See pg. 350</i>   | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>                             | <i>See pg. 328</i>             | <i>See pg. 312</i>                              | <i>See pg. 315</i>                                  | <i>See pg. 317</i>   |
|--|--|--|-----------------------|--|--|--------------------------------|---|---|--|
| VALVE SPRING AND RETAINER KITS                   | VALVE SPRINGS  | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS   | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
| 11309-1 <sup>d,f</sup><br>11310-1 <sup>e,f</sup> | 99846-16 <sup>g</sup><br>99838-16 <sup>e</sup><br>96802-16 <sup>h</sup><br>144846-16 <sup>aa</sup>   | 99915-16 <sup>j</sup><br>99944-16                          | 99820-16 <sup>e</sup> | 99051-1 <sup>l</sup><br>99097-1 <sup>m</sup>                         | 10621-16 <sup>o</sup><br>95624-16 <sup>p</sup> | 10975-1 <sup>q</sup>           | 11801-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t,z</sup><br>11744-16 <sup>u,z</sup>  | 11750-16 <sup>w,z</sup><br>10750-16 <sup>w,z</sup><br>10751-16 <sup>r</sup><br>10758-16 <sup>r</sup> |
| 11309-1 <sup>d,f</sup><br>11310-1 <sup>e,f</sup> | 99846-16 <sup>g</sup><br>99838-16 <sup>e</sup><br>96802-16 <sup>h</sup><br>144846-16 <sup>aa</sup>   | 99915-16 <sup>j</sup><br>99944-16                          | 99820-16 <sup>e</sup> | 99051-1 <sup>l</sup><br>99097-1 <sup>m</sup>                         | 10621-16 <sup>o</sup><br>95624-16 <sup>p</sup> | 10975-1 <sup>q</sup>           | 11801-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t,z</sup><br>11744-16 <sup>u,z</sup>  | 11750-16 <sup>w,z</sup><br>10750-16 <sup>w,z</sup><br>10751-16 <sup>r</sup><br>10758-16 <sup>r</sup> |
| 11309-1 <sup>d,f</sup><br>11310-1 <sup>e,f</sup> | 99846-16 <sup>g</sup><br>99838-16 <sup>e</sup><br>96802-16 <sup>h</sup><br>144846-16 <sup>aa</sup>   | 99915-16 <sup>j</sup><br>99944-16                          | 99820-16 <sup>e</sup> | 99051-1 <sup>l</sup><br>99097-1 <sup>m</sup>                         | 10621-16 <sup>o</sup><br>95624-16 <sup>p</sup> | 10975-1 <sup>q</sup>           | 11801-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t,z</sup><br>11744-16 <sup>u,z</sup>  | 11750-16 <sup>w,z</sup><br>10750-16 <sup>w,z</sup><br>10751-16 <sup>r</sup><br>10758-16 <sup>r</sup> |
| 11309-1 <sup>d,f</sup><br>11310-1 <sup>e,f</sup> | 99846-16 <sup>g</sup><br>99838-16 <sup>e</sup><br>96877-16 <sup>e,i</sup><br>144846-16 <sup>aa</sup> | 99915-16 <sup>j</sup><br>99944-16<br>99969-16 <sup>k</sup> | 99820-16 <sup>e</sup> | 99051-1 <sup>l</sup><br>99097-1 <sup>m</sup><br>99094-1 <sup>n</sup> | 95624-16 <sup>p</sup>                          | 10975-1 <sup>q</sup>           | 11801-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t,z</sup><br>11744-16 <sup>u,z</sup>  | 11750-16 <sup>w,z</sup><br>10750-16 <sup>w,z</sup><br>10751-16 <sup>r</sup><br>10758-16 <sup>r</sup> |
| 11309-1 <sup>d,f</sup><br>11310-1 <sup>e,f</sup> | 99846-16 <sup>g</sup><br>99838-16 <sup>e</sup><br>96877-16 <sup>e,i</sup><br>144846-16 <sup>aa</sup> | 99915-16 <sup>j</sup><br>99944-16<br>99969-16 <sup>k</sup> | 99820-16 <sup>e</sup> | 99051-1 <sup>l</sup><br>99097-1 <sup>m</sup><br>99094-1 <sup>n</sup> | 10621-16 <sup>o</sup><br>95624-16 <sup>p</sup> | 10975-1 <sup>q</sup>           | 11801-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t,z</sup><br>11744-16 <sup>u,z</sup>  | 11750-16 <sup>w,z</sup><br>10750-16 <sup>w,z</sup><br>10751-16 <sup>r</sup><br>10758-16 <sup>r</sup> |
| 11309-1 <sup>d,f</sup><br>11310-1 <sup>e,f</sup> | 99846-16 <sup>g</sup><br>99838-16 <sup>e</sup><br>96877-16 <sup>e,i</sup><br>144846-16 <sup>aa</sup> | 99915-16 <sup>j</sup><br>99944-16<br>99969-16 <sup>k</sup> | 99820-16 <sup>e</sup> | 99051-1 <sup>l</sup><br>99097-1 <sup>m</sup><br>99094-1 <sup>n</sup> | 10621-16 <sup>o</sup><br>95624-16 <sup>p</sup> | 10975-1 <sup>q</sup>           | 11801-16 <sup>r</sup><br>10800C-16 <sup>s</sup> | 11774-16 <sup>t,z</sup><br>11744-16 <sup>u,z</sup>  | 11750-16 <sup>w,z</sup><br>10750-16 <sup>w,z</sup><br>10751-16 <sup>r</sup><br>10758-16 <sup>r</sup> |

**Section Continued**

- a** Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required.
- b** For use with standard GM alignment bars.
- c** For use with standard GM alignment bars. Required for use with camshafts having greater than stock lobe lift or reduced base circle diameters.
- d** Contains standard diameter valve springs (99846-16), and machined steel valve stem locks (99095-1), no machining required.
- e** Must machine cylinder heads.
- f** Valve guide machining may be required to insure sufficient valve guide-to-retainer clearance at full valve lift due to limited travel with stock components.
- g** Standard diameter XHTCS tool steel valve springs, no machining required.
- h** Standard diameter chrome silicon valve springs for 1.750" assembly height.
- i** For +/- .100" length valves.
- j** For standard diameter valve springs.
- k** Requires Crane Multi Fit valve locks.
- l** Machined steel, heat treated, .050" additional assembly height for 99846-16 and 96802-16 valve springs. May interfere with self-aligning rocker arms.
- m** Machined steel, heat treated.
- n** Machined steel, heat treated, Multi Fit.
- o** Heavy wall, heat treated, for use with either pushrod guideplate or non-guideplate cylinder heads.
- p** Pro Series one-piece, for use with either pushrod guideplate or non-guideplate cylinder heads.
- q** Performance steel billet gears and roller chain set (for 1987-91 applications).
- r** 1.5 ratio, extra long slot (not self-aligning).
- s** 1.5 ratio, extra long slot, Nitro Carb (not self-aligning).
- t** Crane Classic extruded, 1.5 ratio (not self-aligning). Factory cast valve covers may require internal clearancing.
- u** Energizer, 1.5 ratio (not self-aligning), will not have sufficient clearance in factory cast valve covers.
- v** 1.5 ratio (not self-aligning). Factory cast valve covers may require internal clearancing.
- w** 1.5 ratio, (not self-aligning), narrow body for center bolt valve covers.
- x** 1.5 ratio, self-aligning narrow body for center bolt valve covers.
- y** 1.6 ratio, self-aligning narrow body for center bolt valve covers.
- z** In order to use these rocker arms on engines originally equipped with self-aligning rockers, hardened pushrod guideplates and heat-treated pushrods must be installed, and valve cover clearance checked.
- aa** Standard diameter PAC Enhanced valve springs for 1.750" assembly height.

### COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                     | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b><br>Good mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, primarily used in 383+ cu.in. engines, auto trans w/2500+ converter, marine applications: for modified engines with free-flowing above water exhaust systems for performance applications in light pleasure and ski boats, including jet boats, 3000-3800 cruise RPM, 9.5 to 11.0 compression ratio advised. Good w/supercharger, 14 lbs. maximum boost w/8.0 maximum compression ratio advised, 1.040" base circle for long stroke clearance. | <b>HR-224/345-2S-14.04 IG</b>    | 2200-6400             | <b>109871<sup>a</sup></b>                  | <b>10535-16<sup>b</sup></b> | 224  | 286   | 114                           | 3 41   | .000                        | .518                          |
|   |                                  |                       |  |                             | 232  | 294   | 55 (3)                        | .000   | .539                        |                               |
| Good mid range torque and HP, fair idle, performance usage, 3600-4400 cruise RPM, good with manifold nitrous system, 10.0 to 11.5 compression ratio advised. Good w/Roots supercharger, 15 lbs. maximum boost w/8.0 maximum compression ratio advised, .900" base circle for long stroke clearance.   | <b>HR-230/359-2S-12.90 IG</b>    | 2600-6600             | <b>109661<sup>a</sup></b>                  | <b>10535-16<sup>b</sup></b> | 230  | 292   | 112                           | 8 42   | .000                        | .539                          |
|   |                                  |                       |  |                             | 238  | 300   | 56 2                          | .000   | .558                        |                               |
| Good mid range torque and HP, fair idle, performance usage, mild bracket racing, auto trans w/3000+ converter, 3800-4600 cruise RPM, good w/manifold nitrous system, 10.0 to 11.5 compression ratio advised. Good w/Roots supercharger, 15 lbs. maximum boost, w/8.0 maximum compression ratio advised.   | <b>HR-296-2S-12 IG</b>           | 2800-6800             | <b>109841<sup>a</sup></b>                  | <b>10535-16<sup>b</sup></b> | 234  | 296   | 112                           | 10 44  | .000                        | .539                          |
|   |                                  |                       |  |                             | 242  | 304   | 58 4                          | .000   | .558                        |                               |
| Good mid range torque and HP, fair idle, performance usage, mild bracket racing, auto trans w/3000+ converter, 3800-4600 cruise RPM, good w/manifold nitrous system, 10.0 to 11.5 compression ratio advised. Good w/Roots supercharger, 15 lbs. maximum boost, w/8.0 maximum compression ratio advised, .900" base circle for long stroke clearance.  | <b>HR-234/365-2S-12.90 IG</b>    | 2800-6800             | <b>109691<sup>a</sup></b>                  | <b>10535-16<sup>b</sup></b> | 234  | 296   | 112                           | 10 44  | .000                        | .548                          |
|   |                                  |                       |  |                             | 242  | 304   | 58 4                          | .000   | .558                        |                               |
| Rough idle, performance usage, good upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, 4200-5000 cruise RPM, 10.5 to 12.0 compression ratio advised, 370+ cu.in. supercharged and/or nitrous, 1.040" base circle for long stroke clearance.   | <b>HR-302-2S-10.04 IG</b>        | 3200-7200             | <b>109651<sup>a</sup></b>                  | <b>10535-16<sup>b</sup></b> | 240  | 302   | 110                           | 15 45  | .000                        | .558                          |
|   |                                  |                       |  |                             | 244  | 306   | 57 7                          | .000   | .558                        |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel, it is HIGHLY RECOMMENDED that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** The camshafts listed above incorporate the front ignition drive pilot hole for late model applications. A long cam dowel pin is installed, which can be driven in further when required for short dowel pin application engines.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

Since 1975, General Motors divisions have exchanged engines

throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                      | See pg. 337   | See pg. 350  | See pg. 362           | See pg. 360  | See pg. 306                                    | See pg. 328                    | See pg. 312                                     | See pg. 315   | See pg. 317  |
|--|---|--|-----------------------|--|--|--------------------------------|---|---|--|
| VALVE SPRING AND RETAINER KITS                   | VALVE SPRINGS   | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS   | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
| 11309-1 <sup>c,e</sup><br>11310-1 <sup>d,e</sup> | 99846-16 <sup>f</sup><br>99838-16 <sup>d</sup><br>96877-16 <sup>d,h</sup><br>144846-16 <sup>y</sup> | 99915-16 <sup>h</sup><br>99944-16<br>99969-16 <sup>i</sup> | 99820-16 <sup>d</sup> | 99051-1 <sup>j</sup><br>99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 95624-16 <sup>n</sup>                          | 10975-1 <sup>o</sup>           | 11801-16 <sup>p</sup><br>10800C-16 <sup>q</sup> | 11774-16 <sup>r,x</sup><br>11744-16 <sup>s,x</sup>  | 11750-16 <sup>t,x</sup><br>10750-16 <sup>u,x</sup><br>10751-16 <sup>v</sup><br>10758-16 <sup>w</sup> |
| 11309-1 <sup>c,e</sup><br>11310-1 <sup>d,e</sup> | 99846-16 <sup>f</sup><br>99838-16 <sup>d</sup><br>96877-16 <sup>d,h</sup><br>144846-16 <sup>y</sup> | 99915-16 <sup>h</sup><br>99944-16<br>99969-16 <sup>i</sup> | 99820-16 <sup>d</sup> | 99051-1 <sup>j</sup><br>99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 95626-16 <sup>n</sup>                          | 10975-1 <sup>o</sup>           | 11801-16 <sup>p</sup><br>10800C-16 <sup>q</sup> | 11774-16 <sup>r,x</sup><br>11744-16 <sup>s,x</sup>  | 11750-16 <sup>t,x</sup><br>10750-16 <sup>u,x</sup><br>10751-16 <sup>v</sup><br>10758-16 <sup>w</sup> |
| 11309-1 <sup>c,e</sup><br>11310-1 <sup>d,e</sup> | 99846-16 <sup>f</sup><br>99838-16 <sup>d</sup><br>96877-16 <sup>d,h</sup><br>144846-16 <sup>y</sup> | 99915-16 <sup>h</sup><br>99944-16<br>99969-16 <sup>i</sup> | 99820-16 <sup>d</sup> | 99051-1 <sup>j</sup><br>99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 10621-16 <sup>m</sup><br>95624-16 <sup>n</sup> | 10975-1 <sup>o</sup>           | 11801-16 <sup>p</sup><br>10800C-16 <sup>q</sup> | 11774-16 <sup>r,x</sup><br>11744-16 <sup>s,x</sup>  | 11750-16 <sup>t,x</sup><br>10750-16 <sup>u,x</sup><br>10751-16 <sup>v</sup><br>10758-16 <sup>w</sup> |
| 11309-1 <sup>c,e</sup><br>11310-1 <sup>d,e</sup> | 99846-16 <sup>f</sup><br>99838-16 <sup>d</sup><br>96877-16 <sup>d,h</sup><br>144846-16 <sup>y</sup> | 99915-16 <sup>h</sup><br>99944-16<br>99969-16 <sup>i</sup> | 99820-16 <sup>d</sup> | 99051-1 <sup>j</sup><br>99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 95626-16 <sup>n</sup>                          | 10975-1 <sup>o</sup>           | 11801-16 <sup>p</sup><br>10800C-16 <sup>q</sup> | 11774-16 <sup>r,x</sup><br>11744-16 <sup>s,x</sup>  | 11750-16 <sup>t,x</sup><br>10750-16 <sup>u,x</sup><br>10751-16 <sup>v</sup><br>10758-16 <sup>w</sup> |
| 11309-1 <sup>c,e</sup><br>11310-1 <sup>d,e</sup> | 99846-16 <sup>f</sup><br>99838-16 <sup>d</sup><br>96877-16 <sup>d,h</sup><br>144846-16 <sup>y</sup> | 99915-16 <sup>h</sup><br>99944-16<br>99969-16 <sup>i</sup> | 99820-16 <sup>d</sup> | 99051-1 <sup>j</sup><br>99097-1 <sup>k</sup><br>99094-1 <sup>l</sup> | 95625-16 <sup>n</sup>                          | 10975-1 <sup>o</sup>           | 11801-16 <sup>p</sup><br>10800C-16 <sup>q</sup> | 11774-16 <sup>r,x</sup><br>11744-16 <sup>s,x</sup>  | 11750-16 <sup>t,x</sup><br>10750-16 <sup>u,x</sup><br>10751-16 <sup>v</sup><br>10758-16 <sup>w</sup> |

- a Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required.
- b For use with standard GM alignment bars. Required for use with camshafts having greater than stock lobe lift or reduced base circle diameters.
- c Contains standard diameter valve springs (99846-16), and machined steel valve stem locks (99095-1), no machining required.
- d Must machine cylinder heads.
- e Valve guide machining may be required to insure sufficient valve guide-to-retainer clearance at full valve lift due to limited travel with stock components.
- f Standard diameter XHTCS tool steel valve springs, no machining required.
- g For ±.100" length valves.
- h For standard diameter valve springs.
- i Requires Crane Multi Fit valve locks.
- j Machined steel, heat treated, .050" additional assembly height for 99846-16 and 96802-16 valve springs. May interfere with self-aligning rocker arms.
- k Machined steel, heat treated.
- l Machined steel, heat treated, Multi Fit.
- m Heavy wall, heat treated, for use with either pushrod guideplate or non-guideplate cylinder heads.
- n Pro Series one-piece, for use with either pushrod guideplate or non-guideplate cylinder heads.
- o Performance steel billet gears and roller chain set (for 1987-91 applications).
- p 1.5 ratio, extra long slot (not self-aligning).
- q 1.5 ratio, extra long slot, Nitro Carb (not self-aligning).
- r Crane Classic extruded, 1.5 ratio (not self-aligning). Factory cast valve covers may require internal-clearancing.
- s Energizer, 1.5 ratio (not self-aligning), will not have sufficient clearance in factory cast valve covers.
- t 1.5 ratio (not self-aligning). Factory cast valve covers may require internal clearancing.
- u 1.5 ratio, (not self-aligning), narrow body for center bolt valve covers.
- v 1.5 ratio, self-aligning narrow body for center bolt valve covers.
- w 1.6 ratio, self-aligning narrow body for center bolt valve covers.
- x In order to use these rocker arms on engines originally equipped with self-aligning rockers, hardened pushrod guideplates and heat-treated pushrods must be installed, and valve cover clearance checked.
- y Standard diameter PAC Enhanced valve springs for 1.750" assembly height.

# Chevrolet V-8 87-99

305 (5.0L)-350 (5.7L) cu.in. (except 5.7L LS1)

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b>  |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Excellent low end and mid range torque and HP, good idle, daily performance usage, mild bracket racing, auto trans w/2500+ converter, 3000-3400 cruise RPM, 9.5 to 11.0 compression ratio advised.  | SR-228/338-2S-12 IG              | 2200-6200             | 108541 <sup>a</sup>                        | 11570-16 <sup>b</sup> | 228<br>236                                 | 278<br>280                                    | 112                           | 7 41<br>55 1                                 | .020<br>.020                | .507<br>.525                  |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, 383+ cu.in., auto trans w/3000+ converter, 3400-3800 cruise RPM, good with plate or manifold nitrous system, 10.5 to 11.5 compression ratio advised, .900" base circle for long stroke clearance. Good with centrifugal or small Roots supercharger, 10 lbs. maximum boost w/8.5 maximum compression ratio advised. | SR-232/350-2S-12.90 IG           | 2400-6600             | 108571 <sup>a</sup>                        | 11570-16 <sup>b</sup> | 232<br>240                                 | 286<br>294                                    | 112                           | 9 43<br>57 3                                 | .020<br>.020                | .525<br>.543                  |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/3000+ converter, 3400-3800 cruise RPM, good with plate or manifold nitrous system, 10.5 to 11.5 compression ratio advised. Good with centrifugal or small Roots supercharger, 10 lbs. maximum boost w/8.5 maximum compression ratio advised.   | SR-236/350-2S-12 IG              | 2400-6600             | 108551 <sup>a</sup>                        | 11570-16 <sup>b</sup> | 236<br>244                                 | 286<br>294                                    | 112                           | 11 45<br>59 5                                | .020<br>.020                | .525<br>.543                  |
| Good mid range torque and HP, fair idle, performance usage, w/manifold nitrous system, bracket racing, 383+ cu.in., auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised, .900" base circle for long stroke clearance. Good w/Roots supercharger, 14 pounds maximum boost w/8.0 maximum compression ratio advised.  | SR-240/362-2S-12.90 IG           | 3400-7200             | 108611 <sup>a</sup>                        | 11570-16 <sup>b</sup> | 240<br>248                                 | 294<br>302                                    | 112                           | 13 47<br>61 7                                | .020<br>.020                | .543<br>.561                  |
| Good mid to upper RPM torque and HP, fair idle, performance usage, w/manifold nitrous system, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised. Good w/Roots supercharger, 14 pounds maximum boost w/ 8.0 maximum compression ratio advised.  | SR-244/362-2S-12 IG              | 3400-7200             | 108521 <sup>a</sup>                        | 11570-16 <sup>b</sup> | 244<br>252                                 | 294<br>302                                    | 112                           | 15 49<br>63 9                                | .020<br>.020                | .543<br>.561                  |

CAMSHAFTS

# Chevrolet V-8 92-96

305 (5.0L)-350 (5.7L) cu.in. LT1

## Hydraulic Roller Camshafts

|  |      |           |                     |  |            |            |     |                   |              |              |
|--|------|-----------|---------------------|--|------------|------------|-----|-------------------|--------------|--------------|
| Good low end torque, for 94-96 aluminum head equipped LT1 Camaros, Firebirds and Corvettes. Works in stock and mild modified engines. Boosts mid and top end without low end loss. Use 10758-16 1.6 ratio rocker arms for more power. Not for use w/stock springs. For mass air F.I. only.   | 2033 | 1500-5700 | 104227 <sup>a</sup> | 10530-16 <sup>c</sup><br>10535-16 <sup>d</sup> | 210<br>224 | 272<br>286 | 112 | (2) 32<br>49 (6)  | .000<br>.000 | .479<br>.518 |
| For 94-95 highly modified, aluminum head LT1 Camaros, Firebirds and Corvettes. High flow heads, headers and exhaust required. Manual transmission recommended. Top end power with some low end loss. Use 10758-16 1.6 ratio rocker arms for more power. Not for use w/stock springs. For mass air F.I. only. (50 state legal for listed applications, C.A.R.B. E.O. D-225-55). | 2050 | 2400-6400 | 104241 <sup>a</sup> | 10535-16 <sup>d</sup>                          | 218<br>218 | 280<br>280 | 116 | (2) 40<br>50 (12) | .000<br>.000 | .498<br>.498 |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel, it is HIGHLY RECOMMENDED that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** The camshafts listed above incorporate the front ignition drive pilot hole for late model applications. A long cam dowel pin is installed, which can be driven in further when required for short dowel pin application engines.

**NOTE:** 1988-99 Chevrolet 305 and 350 V-8 engines (and some 1987 350 V-8 engines) use a different configuration camshaft core than the 57-87 engines and cannot be interchanged.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360          | See pg. 306                                    | See pg. 328                    | See pg. 312       | See pg. 315                        | See pg. 317                                    |
|--------------------------------|-----------------------|-------------|-----------------------|----------------------|--|--------------------------------|-------------------|------------------------------------|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ENERGIZER | ROCKERS — GOLD RACE                            |
|                                | 99893-16 <sup>f</sup> | 99951-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>h</sup> | 11621-16 <sup>i</sup><br>95638-16 <sup>j</sup> | 10975-1 <sup>k</sup>           |                   | 11774-16 <sup>m,n</sup>            | 11750-16 <sup>o</sup><br>10750-16 <sup>p</sup> |
|                                | 99893-16 <sup>f</sup> | 99951-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>h</sup> | 95638-16 <sup>j</sup>                          | 10975-1 <sup>k</sup>           |                   | 11774-16 <sup>m,n</sup>            | 11750-16 <sup>o</sup><br>10750-16 <sup>p</sup> |
|                                | 99893-16 <sup>f</sup> | 99951-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>h</sup> | 11621-16 <sup>i</sup><br>95638-16 <sup>j</sup> | 10975-1 <sup>k</sup>           |                   | 11774-16 <sup>m,n</sup>            | 11750-16 <sup>o</sup><br>10750-16 <sup>p</sup> |
|                                | 99893-16 <sup>f</sup> | 99951-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>h</sup> | 95638-16 <sup>j</sup>                          | 10975-1 <sup>k</sup>           |                   | 11774-16 <sup>m,n</sup>            | 11750-16 <sup>o</sup><br>10750-16 <sup>p</sup> |
|                                | 99893-16 <sup>f</sup> | 99951-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>h</sup> | 11621-16 <sup>i</sup><br>95638-16 <sup>j</sup> | 10975-1 <sup>k</sup>           |                   | 11774-16 <sup>m,n</sup>            | 11750-16 <sup>o</sup><br>10750-16 <sup>p</sup> |

|                      |  |  |  |                      |  |  |                        |  |  |
|----------------------|--|--|--|----------------------|--|--|------------------------|--|--|
| 11308-1 <sup>e</sup> | 99893-16 <sup>e</sup><br>96802-16 <sup>g</sup> | 99951-16 <sup>e</sup><br>99915-16 <sup>g</sup> |  | 99097-1 <sup>h</sup> | 10621-16 <sup>i</sup><br>95624-16 <sup>j</sup> |  | 10800C-16 <sup>i</sup> |  | 10751-16 <sup>q</sup><br>10758-16 <sup>r</sup> |
| 11308-1 <sup>e</sup> | 99893-16 <sup>e</sup><br>96802-16 <sup>g</sup> | 99951-16 <sup>e</sup><br>99915-16 <sup>g</sup> |  | 99097-1 <sup>h</sup> | 10621-16 <sup>i</sup><br>95624-16 <sup>j</sup> |  | 10800C-16 <sup>i</sup> |  | 10751-16 <sup>q</sup><br>10758-16 <sup>r</sup> |

- a** Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor gear not required.
- b** Ultra Pro Series vertical locking bar roller lifters.
- c** For use with standard GM alignment bars.
- d** Optional Crane long travel hydraulic roller lifters, for use with standard GM alignment bars. Required for use with high lift and small base circle camshafts.
- e** For LT1 aluminum cylinder heads.
- f** Must machine cylinder heads.
- g** For LT1 iron cylinder heads.
- h** Machined steel, heat treated.
- i** Heavy wall, heat treated, for use with either pushrod guideplate or non-guideplate cylinder heads.
- j** Pro Series one-piece, for use with either pushrod guideplate or non-guideplate cylinder heads.
- k** Performance steel billet gears and roller chain set (for 1987-91 applications).
- l** 1.5 ratio, extra long slot, Nitro Carb (not self-aligning).
- m** Crane Classic extruded, 1.5 ratio (not self-aligning). Factory cast valve covers may require internal clearancing.
- n** In order to use these rocker arms on engines originally equipped with self-aligning rockers, hardened pushrod guideplates and heat-treated pushrods must be installed, and valve cover clearance checked.
- o** 1.5 ratio (not self-aligning). Factory cast valve covers may require internal clearancing.
- p** 1.5 ratio (not self-aligning), narrow body for center bolt valve covers.
- q** 1.5 ratio, self-aligning narrow body for center bolt valve covers.
- r** 1.6 ratio, self-aligning narrow body for center bolt valve covers. Valve springs and retainers must be changed to allow for increased valve travel.

### COMPLETE CAM SPECIFICATIONS

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | See pg. 294<br>LIFTERS   | Degrees             | Advertised          | Degrees            | Open/Close          | Lash        | Gross        |
|--|----------------------------------|-----------------------|--|--|---------------------|---------------------|--------------------|---------------------|-------------|--------------|
|  |                                  |                       |  |  | Duration<br>@ .050" | Degrees<br>Duration | Lobe<br>Separation | @ .050"<br>Cam Lift | Hot<br>Int. | Lift<br>Int. |
| Great daily driver or truck towing, for stock 4.8L thru 5.7L, smooth idle, great fuel economy, good torque and HP increase, computer upgrades not required, can use stock valve springs, good w/1.8:1 rocker arms.   | HR-206/294-2S-14.55              | 1400-5500             | 1449511*                                   | 144530-16 <sup>a</sup><br>144536-16 <sup>b</sup><br>144532-16 <sup>c</sup> | 206                 | 270                 | 114                | (6) 32              | .000        | .500         |
|  |                                  |                       |  |  | 214                 | 278                 | 46 (12)            | .000                | .500        |              |
|  |                                  |                       |  |  | ⚡                   |                     |                    |                     |             |              |
| Good daily driver, for stock or slightly modified 4.8L thru 6.0L, light choppy idle, good fuel economy, overall torque and HP increase, computer upgrades not required, good w/1.8:1 rocker arms.  | HR-210/3241-2S-14 4A             | 1800-6000             | 1449041*                                   | 144530-16 <sup>a</sup><br>144536-16 <sup>b</sup><br>144532-16 <sup>c</sup> | 210                 | 272                 | 114                | (5) 35              | .000        | .551         |
|  |                                  |                       |  |  | 218                 | 280                 | 47 (9)             | .000                | .551        |              |
|  |                                  |                       |  |  | ⚡                   |                     |                    |                     |             |              |
| Great daily driver, for stock 4.8L thru 6.0L, slight idle note, great fuel economy, overall torque and HP increase, computer upgrades not required, good w/1.8:1 rocker arms.  | HR-210/3241-2S-16 2A             | 1600-6000             | 1449051*                                   | 144530-16 <sup>a</sup><br>144536-16 <sup>b</sup><br>144532-16 <sup>c</sup> | 210                 | 272                 | 116                | (9) 39              | .000        | .551         |
|  |                                  |                       |  |  | 218                 | 280                 | 47 (9)             | .000                | .551        |              |
|  |                                  |                       |  |  | ⚡                   |                     |                    |                     |             |              |
| Good daily driver, for stock or slightly modified 4.8L thru 6.0L, light choppy idle, good fuel economy, 10.5+ compression ratio advised, computer upgrades required, good w/1.8:1 rocker arms.   | HR-216/3241-15                   | 2200-6300             | 1449061*                                   | 144530-16 <sup>a</sup><br>144536-16 <sup>b</sup><br>144532-16 <sup>c</sup> | 216                 | 278                 | 115                | (2) 38              | .000        | .551         |
|  |                                  |                       |  |  | 216                 | 278                 | 48 (12)            | .000                | .551        |              |
|  |                                  |                       |  |  | ⚡                   |                     |                    |                     |             |              |
| Good daily driver, for stock or modified 4.8L thru 6.0L, light choppy idle, good fuel economy, 10.5+ compression ratio advised, good with supercharger or nitrous, computer upgrades required.   | HR-216/344-2S1-16 3A             | 1900-6000             | 1449071*                                   | 144530-16 <sup>a</sup><br>144536-16 <sup>b</sup><br>144532-16 <sup>c</sup> | 216                 | 277                 | 116                | (5) 41              | .000        | .585         |
|  |                                  |                       |  |  | 222                 | 283                 | 50 (8)             | .000                | .585        |              |
|  |                                  |                       |  |  | ⚡                   |                     |                    |                     |             |              |
| Good daily driver, for stock or modified 4.8L thru 6.0L, light choppy idle, good fuel economy, good with supercharger or nitrous, computer upgrades required, good w/1.8:1 ratio rocker arms.  | HR-216/3241-2S-15                | 2000-6500             | 1449561*                                   | 144530-16 <sup>a</sup><br>144536-16 <sup>b</sup><br>144532-16 <sup>c</sup> | 216                 | 278                 | 115                | (2) 38              | .000        | .551         |
|  |                                  |                       |  |  | 224                 | 286                 | 52 (8)             | .000                | .551        |              |
|  |                                  |                       |  |  | ⚡                   |                     |                    |                     |             |              |
| Good daily driver, for stock or modified 5.7L thru 6.0L, light choppy idle, good fuel economy, 10.5+ compression ratio advised, computer upgrades required.  | HR-216/344-2S-14                 | 2200-6500             | 1449081*                                   | 144530-16 <sup>a</sup><br>144536-16 <sup>b</sup><br>144532-16 <sup>c</sup> | 216                 | 277                 | 114                | (1) 37              | .000        | .585         |
|  |                                  |                       |  |  | 224                 | 285                 | 51 (7)             | .000                | .585        |              |
|  |                                  |                       |  |  | ⚡                   |                     |                    |                     |             |              |
| Daily driver, for modified 5.7L thru 6.0L, light choppy idle, fair fuel economy, headers and aft cat exhaust advised, 10.5+ compression ratio advised, auto trans w/2400-2800 stall converter, computer upgrades required, good w/1.8:1 ratio rocker arms. | HR-220/3241-2S1-14               | 2400-6500             | 1449011*                                   | 144530-16 <sup>a</sup><br>144536-16 <sup>b</sup><br>144532-16 <sup>c</sup> | 220                 | 282                 | 114                | 1 39                | .000        | .551         |
|  |                                  |                       |  |  | 224                 | 286                 | 51 (7)             | .000                | .551        |              |
|  |                                  |                       |  |  | ⚡                   |                     |                    |                     |             |              |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**  
**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel, it is **HIGHLY RECOMMENDED** that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** 1997-up Chevrolet 5.7L LS1/LS6, 1988-99 305 and 350 V-8 (and some 1987 350 V-8) engines, and the 1957-87 262-400 V-8 engines, each use different configuration camshaft cores, and cannot be interchanged.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

Crane Cams offers many different cam lobe profiles for the GM "LS1/LS2/LS6 Engine Family". These hydraulic roller cams are designed for applications ranging from mild street performance upgrades, serious torque and HP increases for trucks, to all-out competition profiles for LS1 powered race cars.

Crane's LS engine family's grinds are designed to take optimum advantage of the LS1/LS2/LS6's lighter valve train and

greatly reduced component inertia. This low inertia allows extraordinarily quick valve acceleration rates. This actually increases the "area beneath the lift curve" in each profile. Simply put, they begin moving the valve off its seat at a much quicker rate, to initiate earlier flow. The profiles retain and lengthen this rate of acceleration during the valve-opening cycle and as it approaches maximum valve lift. They function like a much "bigger" cam (greater duration) yet they increase low-end and mid-range torque in the most often used rpm range. Peak horsepower and torque output are enhanced throughout the entire rpm range. The valve lift tables were also designed to minimize horsepower-robbing



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                    | See pg. 337   | See pg. 350  | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328   | See pg. 317                                      |
|--|---|--|-----------------------|--|---|---|--|
| VALVE SPRING AND RETAINER KITS                 | VALVE SPRINGS   | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY  | — ALUMINUM ROCKERS —<br>GOLD RACE                |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>f</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>i</sup><br>99657-16 <sup>j</sup><br>144944-16 <sup>k</sup><br>144661-16 <sup>l</sup> | 99818-16 <sup>m</sup> | 99108-1 <sup>n</sup><br>99107-1 <sup>o</sup> | 144621-16 <sup>p</sup><br>144622-16 <sup>q</sup><br>95627-16 <sup>r</sup> | 144984-1 <sup>s</sup><br>144985-1 <sup>t</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>f</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>i</sup><br>99657-16 <sup>j</sup><br>144944-16 <sup>k</sup><br>144661-16 <sup>l</sup> | 99818-16 <sup>m</sup> | 99108-1 <sup>n</sup><br>99107-1 <sup>o</sup> | 144621-16 <sup>p</sup><br>144622-16 <sup>q</sup><br>95627-16 <sup>r</sup> | 144984-1 <sup>s</sup><br>144985-1 <sup>t</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>f</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>i</sup><br>99657-16 <sup>j</sup><br>144944-16 <sup>k</sup><br>144661-16 <sup>l</sup> | 99818-16 <sup>m</sup> | 99108-1 <sup>n</sup><br>99107-1 <sup>o</sup> | 144621-16 <sup>p</sup><br>144622-16 <sup>q</sup><br>95627-16 <sup>r</sup> | 144984-1 <sup>s</sup><br>144985-1 <sup>t</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>f</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>i</sup><br>99657-16 <sup>j</sup><br>144944-16 <sup>k</sup><br>144661-16 <sup>l</sup> | 99818-16 <sup>m</sup> | 99108-1 <sup>n</sup><br>99107-1 <sup>o</sup> | 144621-16 <sup>p</sup><br>144622-16 <sup>q</sup><br>95627-16 <sup>r</sup> | 144984-1 <sup>s</sup><br>144985-1 <sup>t</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>f</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>i</sup><br>99657-16 <sup>j</sup><br>144944-16 <sup>k</sup><br>144661-16 <sup>l</sup> | 99818-16 <sup>m</sup> | 99108-1 <sup>n</sup><br>99107-1 <sup>o</sup> | 144621-16 <sup>p</sup><br>144622-16 <sup>q</sup><br>95627-16 <sup>r</sup> | 144984-1 <sup>s</sup><br>144985-1 <sup>t</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>f</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>i</sup><br>99657-16 <sup>j</sup><br>144944-16 <sup>k</sup><br>144661-16 <sup>l</sup> | 99818-16 <sup>m</sup> | 99108-1 <sup>n</sup><br>99107-1 <sup>o</sup> | 144621-16 <sup>p</sup><br>144622-16 <sup>q</sup><br>95627-16 <sup>r</sup> | 144984-1 <sup>s</sup><br>144985-1 <sup>t</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>f</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>i</sup><br>99657-16 <sup>j</sup><br>144944-16 <sup>k</sup><br>144661-16 <sup>l</sup> | 99818-16 <sup>m</sup> | 99108-1 <sup>n</sup><br>99107-1 <sup>o</sup> | 144621-16 <sup>p</sup><br>144622-16 <sup>q</sup><br>95627-16 <sup>r</sup> | 144984-1 <sup>s</sup><br>144985-1 <sup>t</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>f</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>i</sup><br>99657-16 <sup>j</sup><br>144944-16 <sup>k</sup><br>144661-16 <sup>l</sup> | 99818-16 <sup>m</sup> | 99108-1 <sup>n</sup><br>99107-1 <sup>o</sup> | 144621-16 <sup>p</sup><br>144622-16 <sup>q</sup><br>95627-16 <sup>r</sup> | 144984-1 <sup>s</sup><br>144985-1 <sup>t</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |

Section Continued

- a OE replacement, for use with standard GM alignment bars and standard base circle camshafts.
- b For use with standard GM alignment bars, long body design for up to .715" valve lift and reduced base circle camshafts.
- c Vertical locking bar hydraulic roller lifters, cylinder head removal is required.
- d Contains 144838-16 dual valve springs, 144944-16 steel retainers, 144460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- e Contains 144838-16 dual valve springs, 144661-16 titanium retainers, 14460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- f Single ovate wire beehive valve springs.
- g Dual valve springs for up to .680" lift, requires Crane 144944-16 or 144661-16 retainers, no machining required. 2002-up cylinder heads will require Crane 144460-16 spring seats.
- h Dual valve springs for up to .660" lift, XHTCS material, requires Crane 144944-16 or 144661-16 retainers, no machining required. 2002-up cylinder heads will require Crane 144460-16 spring seats.
- i Titanium, for 99831-16 single valve springs.
- j Titanium, for 99831-16 single valve springs, requires Crane Multi Fit valve locks.
- k Steel, for 144838-16 and 144847-16 dual valve springs.
- l Titanium, for 144838-16 and 144847-16 dual valve springs.
- m No machining required.
- n Machined steel, heat treated.
- o Machined steel, heat treated, Multi Fit.
- p Pro Series one-piece, stock length.
- q Pro Series one-piece, for use with Crane aluminum rocker arm kits (included in 144750-16 and 144759-16 kits).
- r Pro Series one piece, stock length -.050".
- s Pro Series steel billet gears and double roller chain set with vernier adjustment, for LS1 and LS6, without cam sensor trigger.
- t Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for early LS2, with single trigger cam sensor feature.
- u Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for late LS2, LS3, LS7, and LS9, with four trigger cam sensor feature.
- v 1.7 ratio, 3/8" stud, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.
- w 1.8 ratio, 3/8" stud, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.

### COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |      |
|---|----------------------------------|-----------------------|--|---------|--|---|-------------------------------|--|-----------------------------|-------------------------------|------|
| Daily driver, for modified 5.7L thru 6.0L, choppy idle, fair fuel economy, headers and aft cat exhaust advised, 10.8+ compression ratio advised, auto trans w/2800-3000 stall converter, computer upgrades required, good w/1.8:1 ratio rocker arms.  | HR-222/3241-2S-15 3A             | 2300-6800             | 1449091*                                   | 3       | 144530-16 <sup>a</sup>                     | 224   | 284                           | 115  | (1) 43                      | .000                          | .551 |
|   |                                  |                       |  |         | 144536-16 <sup>b</sup>                     | 228   | 290                           | 52 (4)                                       | .000                        | .551                          |      |
|   |                                  |                       |  |         | 144532-16 <sup>c</sup>                     |   |                               |  |                             |                               |      |
| Daily driver, for modified 5.7L thru 6.0L, choppy idle, fair fuel economy, headers and aft cat exhaust advised, 11.0+ compression ratio advised, auto trans w/3000-3400 stall converter, computer upgrades required, good w/1.8:1 ratio rocker arms.  | HR-224/3241-14                   | 2300-6500             | 1449591*                                   | 3       | 144530-16 <sup>a</sup>                     | 224   | 286                           | 114  | 3 41                        | .000                          | .551 |
|   |                                  |                       |  |         | 144536-16 <sup>b</sup>                     | 224   | 286                           | 51 (7)                                       | .000                        | .551                          |      |
|   |                                  |                       |  |         | 144532-16 <sup>c</sup>                     |   |                               |  |                             |                               |      |
| Weekend driver, for modified 5.7L thru 6.0L, choppy idle, fair fuel economy, headers and aft cat exhaust advised, 10.8+ compression ratio advised, auto trans w/2800-3200 stall converter, computer upgrades required, good w/1.8:1 ratio rocker arms.  | HR-224/3241-2S-14 2A             | 2200-6500             | 1449101*                                   | 3       | 144530-16 <sup>a</sup>                     | 224   | 286                           | 114  | 0 44                        | .000                          | .551 |
|   |                                  |                       |  |         | 144536-16 <sup>b</sup>                     | 228   | 290                           | 50 (2)                                       | .000                        | .551                          |      |
|   |                                  |                       |  |         | 144532-16 <sup>c</sup>                     |   |                               |  |                             |                               |      |
| Weekend driver, for modified 5.7L thru 7.0L, choppy idle, fair fuel economy, headers and aft cat exhaust required, 11.0+ compression ratio advised, low ratio gearing required, auto trans w/2800-3200 stall converter, computer upgrades required.   | HR-224/347-2S-14 4A              | 2300-6500             | 1449111*                                   | 3       | 144536-16 <sup>b</sup>                     | 224   | 280                           | 114  | 0.5 43.5                    | .000                          | .590 |
|   |                                  |                       |  |         | 144532-16 <sup>c</sup>                     | 228   | 283                           | 50.5 (2.5)                                   | .000                        | .590                          |      |
|   |                                  |                       |  |         |  |   |                               |  |                             |                               |      |
| Weekend driver, for modified 5.7L thru 7.0L, choppy idle, fair fuel economy, headers and aft cat exhaust required, 11.0+ compression ratio advised, low ratio gearing required, auto trans w/3000-3400 stall converter, computer upgrades required.   | HR-224/347-2S1-15 4A             | 2400-6500             | 1449121*                                   | 3       | 144536-16 <sup>b</sup>                     | 224   | 280                           | 115  | 0.5 44.5                    | .000                          | .590 |
|   |                                  |                       |  |         | 144532-16 <sup>c</sup>                     | 232   | 287                           | 53.5 (1.5)                                   | .000                        | .590                          |      |
|   |                                  |                       |  |         |  |   |                               |  |                             |                               |      |
| Weekend driver, for modified 5.7L thru 7.0L, choppy idle, fair fuel economy, headers and aft cat exhaust required, 11.5+ compression ratio advised, low ratio gearing required, auto trans w/3200-3600 stall converter, computer upgrades required.   | HR-228/353-13 4A                 | 2700-6500             | 1449131*                                   | 3       | 144536-16 <sup>b</sup>                     | 228   | 290                           | 115  | 5 43                        | .000                          | .600 |
|   |                                  |                       |  |         | 144532-16 <sup>c</sup>                     | 228   | 290                           | 51 (3)                                       | .000                        | .600                          |      |
|   |                                  |                       |  |         |  |   |                               |  |                             |                               |      |
| Weekend driver, for modified 5.7L thru 6.0L, choppy idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 11.5+ compression ratio advised, low ratio gearing required, auto trans w/3200-3600 stall converter, computer upgrades required, good w/1.8:1 ratio rocker arms. | HR-228/3241-2S-12                | 2700-6500             | 1449141*                                   | 3       | 144530-16 <sup>a</sup>                     | 228   | 290                           | 112  | 7 41                        | .000                          | .551 |
|   |                                  |                       |  |         | 144536-16 <sup>b</sup>                     | 232   | 294                           | 43 (1)                                       | .000                        | .551                          |      |
|   |                                  |                       |  |         | 144532-16 <sup>c</sup>                     |   |                               |  |                             |                               |      |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel, it is **HIGHLY RECOMMENDED** that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** 1997-up Chevrolet 5.7L LS1/LS6, 1988-99 305 and 350 V-8 (and some 1987 350 V-8) engines, and the 1957-87 262-400 V-8 engines, each use different configuration camshaft cores, and cannot be interchanged.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

Crane Cams offers many different cam lobe profiles for the GM "LS1/LS2/LS6 Engine Family". These hydraulic roller cams are designed for applications ranging from mild street performance upgrades, serious torque and HP increases for trucks, to all-out competition profiles for LS1 powered race cars.

Crane's LS engine family's grinds are designed to take optimum advantage of the LS1/LS2/LS6's lighter valve train and

greatly reduced component inertia. This low inertia allows extraordinarily quick valve acceleration rates. This actually increases the "area beneath the lift curve" in each profile. Simply put, they begin moving the valve off its seat at a much quicker rate, to initiate earlier flow. The profiles retain and lengthen this rate of acceleration during the valve-opening cycle and as it approaches maximum valve lift. They function like a much "bigger" cam (greater duration) yet they increase low-end and mid-range torque in the most often used rpm range. Peak horsepower and torque output are enhanced throughout the entire rpm range. The valve lift tables were also designed to minimize horsepower-robbing

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                    | See pg. 337   | See pg. 350  | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328   | See pg. 317                                      |
|--|---|--|-----------------------|--|---|---|--|
| VALVE SPRING AND RETAINER KITS                 | VALVE SPRINGS   | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY  | — ALUMINUM ROCKERS —<br>GOLD RACE                |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>j</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>j</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>j</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>j</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>j</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>j</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>j</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |

Section Continued

- a OE replacement, for use with standard GM alignment bars and standard base circle camshafts.
- b For use with standard GM alignment bars, long body design for up to .715" valve lift and reduced base circle camshafts.
- c Vertical locking bar hydraulic roller lifters, cylinder head removal is required.
- d Contains 144838-16 dual valve springs, 144944-16 steel retainers, 144460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- e Contains 144838-16 dual valve springs, 144661-16 titanium retainers, 14460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- f Single ovate wire beehive valve springs.
- g Dual valve springs for up to .680" lift, requires Crane 144944-16 or 144661-16 retainers, no machining required. 2002-up cylinder heads will require Crane 144460-16 spring seats.
- h Dual valve springs for up to .660" lift, XHTCS material, requires Crane 144944-16 or 144661-16 retainers, no machining required. 2002-up cylinder heads will require Crane 144460-16 spring seats.
- i Titanium, for 99831-16 single valve springs.
- j Titanium, for 99831-16 single valve springs, requires Crane Multi Fit valve locks.
- k Steel, for 144838-16 and 144847-16 dual valve springs.
- l Titanium, for 144838-16 and 144847-16 dual valve springs.
- m No machining required.
- n Machined steel, heat treated.
- o Machined steel, heat treated, Multi Fit.
- p Pro Series one-piece, stock length.
- q Pro Series one-piece, for use with Crane aluminum rocker arm kits (included in 144750-16 and 144759-16 kits).
- r Pro Series one piece, stock length -.050".
- s Pro Series steel billet gears and double roller chain set with vernier adjustment, for LS1 and LS6, without cam sensor trigger.
- t Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for early LS2, with single trigger cam sensor feature.
- u Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for late LS2, LS3, LS7, and L92, with four trigger cam sensor feature.
- v 1.7 ratio, 3/8" stud, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.
- w 1.8 ratio, 3/8" stud, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.

### COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b>   |                                  |                       |  |  |  |   |                               |  |                             |                               |
| Weekend driver, for modified 5.7L thru 6.0L, choppy idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 11.5+ compression ratio advised, low ratio gearing required, auto trans w/3200-3600 stall converter, computer upgrades required.                                 | <b>HR-228/353-2S1-12</b>         | 2400-6500             | <b>1449601*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b>                                 | 228<br>232                                 | 290<br>294                                    | 112                           | 7 41<br>53 (1)                               | .000<br>.000                | .600<br>.600                  |
| Weekend driver, for modified 5.7L thru 6.0L, choppy idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 11.0+ compression ratio advised, low ratio gearing required, auto trans w/3200-3600 stall converter, computer upgrades required.                                 | <b>HR-228/353-2S1-14 2A</b>      | 2400-6500             | <b>1449151*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b>                                 | 228<br>232                                 | 290<br>294                                    | 114                           | 2 46<br>52 0                                 | .000<br>.000                | .600<br>.600                  |
| Weekend driver, for modified 5.7L thru 6.0L, choppy idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 11.0+ compression ratio advised, low ratio gearing required, auto trans w/3200-3600 stall converter, computer upgrades required.                                 | <b>HR-228/347-2S-15 0A</b>       | 2400-6500             | <b>1449161*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b>                                 | 228<br>236                                 | 283<br>291                                    | 115                           | (2.5) 50.5<br>51.5 4.5                       | .000<br>.000                | .590<br>.590                  |
| Weekend driver, for turbocharged 5.7L thru 6.0L, choppy idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, low ratio gearing required, auto trans w/3200-3600 stall converter, computer upgrades required.  | <b>HR-232/353-2SR-17 2A</b>      | 2600-6400             | <b>1449171*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b>                                 | 232<br>228                                 | 294<br>290                                    | 117                           | 1 51<br>53 (5)                               | .000<br>.000                | .600<br>.600                  |
| Weekend driver, for modified 5.7L thru 6.0L, rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 11.5+ compression ratio advised, low ratio gearing required, auto trans w/3400-4000 stall converter, computer upgrades required.                                  | <b>HR-232/353-2S1-12 4A</b>      | 2900-6500             | <b>1449181*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b>                                 | 232<br>236                                 | 294<br>298                                    | 112                           | 8 44<br>54 2                                 | .000<br>.000                | .600<br>.600                  |
| Weekend driver, for modified 5.7L thru 6.0L, choppy idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 11.5+ compression ratio advised, low ratio gearing required, auto trans w/3600-4000 stall converter, computer upgrades required.                                 | <b>HR-232/353-2S1-14</b>         | 2900-6500             | <b>1449331*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b>                                 | 232<br>236                                 | 294<br>298                                    | 114                           | 7 45<br>57 (1)                               | .000<br>.000                | .600<br>.600                  |
| Weekend driver, for modified 5.7L thru 6.0L, choppy idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 11.0+ compression ratio advised, low ratio gearing required, auto trans w/3200-3600 stall converter, computer upgrades required, good w/1.8:1 ratio rocker arms. | <b>HR-232/3241-2S1-17 3A</b>     | 2600-6600             | <b>1449191*</b>                            | <b>144530-16<sup>a</sup></b><br><b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b> | 232<br>240                                 | 294<br>302                                    | 117                           | 2 50<br>60 0                                 | .000<br>.000                | .551<br>.551                  |
| Pro Street & Drags, for modified 5.7L - 8.0L, rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised, low ratio gearing required, auto trans w/3600-4400 stall converter, computer upgrades required.                                 | <b>HR-232/353-2S-10 0A</b>       | 2900-6600             | <b>1449201*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b>                                 | 232<br>240                                 | 294<br>302                                    | 110                           | 6 46<br>50 10                                | .000<br>.000                | .600<br>.600                  |

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                    | See pg. 337   | See pg. 350  | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328   | See pg. 317                                      |
|--|---|--|-----------------------|--|---|---|--|
| VALVE SPRING AND RETAINER KITS                 | VALVE SPRINGS   | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY  | — ALUMINUM ROCKERS —<br>GOLD RACE                |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup>                           | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |

Section Continued

- a OE replacement, for use with standard GM alignment bars and standard base circle camshafts.
- b For use with standard GM alignment bars, long body design for up to .715" valve lift and reduced base circle camshafts.
- c Vertical locking bar hydraulic roller lifters, cylinder head removal is required.
- d Contains 144838-16 dual valve springs, 144944-16 steel retainers, 144460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- e Contains 144838-16 dual valve springs, 144661-16 titanium retainers, 14460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- f Single ovate wire beehive valve springs.
- g Dual valve springs for up to .680" lift, requires Crane 144944-16 or 144661-16 retainers, no machining required. 2002-up cylinder heads will require Crane 144460-16 spring seats.
- h Dual valve springs for up to .660" lift, XHTCS material, requires Crane 144944-16 or 144661-16 retainers, no machining required. 2002-up cylinder heads will require Crane 144460-16 spring seats.
- i Titanium, for 99831-16 single valve springs.
- j Titanium, for 99831-16 single valve springs, requires Crane Multi Fit valve locks.
- k Steel, for 144838-16 and 144847-16 dual valve springs.
- l Titanium, for 144838-16 and 144847-16 dual valve springs.
- m No machining required.
- n Machined steel, heat treated.
- o Machined steel, heat treated, Multi Fit.
- p Pro Series one-piece, stock length.
- q Pro Series one-piece, for use with Crane aluminum rocker arm kits (included in 144750-16 and 144759-16 kits).
- r Pro Series one piece, stock length -.050".
- s Pro Series steel billet gears and double roller chain set with vernier adjustment, for LS1 and LS6, without cam sensor trigger.
- t Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for early LS2, with single trigger cam sensor feature.
- u Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for late LS2, LS3, LS7, and L92, with four trigger cam sensor feature.
- v 1.7 ratio, 3/8" stud, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.
- w 1.8 ratio, 3/8" stud, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.

### COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b><br>Pro Street & Drags, for modified 5.7L - 8.0L, rough idle, upgraded cylinder heads & valvetrain required, headers & aft cat exhaust required, 12.0+ compress. ratio advised, low ratio gearing required, auto trans w/3200-3600 stall converter, computer upgrades required. | <b>HR-236/347-2S-14 0A</b>       | 3000-6800             | <b>1449211*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b> | 236  | 291   | 114                           | 2.5 53.5                                     | .000                        | .590                          |
|  |                                  |                       |  |  | 240  | 295   | 52.5 7.5                      | .000   | .590                        |                               |
| Pro Street and Drags, for modified 5.7L thru 8.0L, rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised, low ratio gearing required, auto trans w/3400-4000 stall converter, computer upgrades required.                           | <b>HR-236/353-2S-12</b>          | 3100-6800             | <b>1449611*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b> | 236  | 298   | 112                           | 11 45  | .000                        | .600                          |
|  |                                  |                       |  |  | 240  | 302   | 57 3                          | .000   | .600                        |                               |
| Pro Street and Drags, for modified 5.7L thru 8.0L, rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 11.5+ compression ratio advised, low ratio gearing required, auto trans w/3200-3600 stall converter, computer upgrades required.                           | <b>HR-236/347-2S1-15</b>         | 2800-6800             | <b>1449221*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b> | 236  | 291   | 115                           | 6.5 49.5                                     | .000                        | .590                          |
|  |                                  |                       |  |  | 244  | 299   | 60.5 3.5                      | .000   | .590                        |                               |
| Pro Street and Drags, for modified 5.7L thru 8.0L, rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised, low ratio gearing required, auto trans w/3600-4400 stall converter, computer upgrades required.                           | <b>HR-236/353-2-10 0A</b>        | 3200-6800             | <b>1449231*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b> | 236  | 298   | 110                           | 8 48   | .000                        | .600                          |
|  |                                  |                       |  |  | 246  | 308   | 53 13                         | .000   | .600                        |                               |
| Pro Street and Drags, for turbocharged 5.7L thru 6.0L, choppy idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised, low ratio gearing required, auto trans w/3400-3600 stall converter, computer upgrades required.                      | <b>HR-240/353-2SR-14</b>         | 3300-7000             | <b>1449241*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b> | 240  | 302   | 114                           | 11 49  | .000                        | .600                          |
|  |                                  |                       |  |  | 236  | 298   | 57 (1)                        | .000   | .600                        |                               |
| Pro Street and Drags, for modified 5.7L thru 8.0L, rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 11.5+ compression ratio advised, low ratio gearing required, auto trans w/3600-4400 stall converter, computer upgrades required.                           | <b>HR-240/353-2S-14 4A</b>       | 3000-7000             | <b>1449251*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b> | 240  | 302   | 114                           | 10 50  | .000                        | .600                          |
|  |                                  |                       |  |  | 246  | 308   | 61 5                          | .000   | .600                        |                               |
| Pro Street and Drags, for modified 5.7L thru 8.0L, rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised, low ratio gearing required, auto trans w/3600-4400 stall converter, computer upgrades required.                           | <b>HR-246/367-2-14</b>           | 3200-7200             | <b>1449261*</b>                            | <b>144536-16<sup>b</sup></b><br><b>144532-16<sup>c</sup></b> | 246  | 303   | 114                           | 12.5 53.5                                    | .000                        | .624                          |
|  |                                  |                       |  |  | 256  | 313   | 65.5 10.5                     | .000   | .624                        |                               |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel, it is HIGHLY RECOMMENDED that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** 1997-up Chevrolet 5.7L LS1/LS6, 1988-99 305 and 350 V-8 (and some 1987 350 V-8) engines, and the 1957-87 262-400 V-8 engines, each use different configuration camshaft cores, and cannot be interchanged.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

Crane Cams offers many different cam lobe profiles for the GM "LS1/LS2/LS6 Engine Family". These hydraulic roller cams are designed for applications ranging from mild street performance upgrades, serious torque and HP increases for trucks, to all-out competition profiles for LS1 powered race cars.

Crane's LS engine family's grinds are designed to take optimum advantage of the LS1/LS2/LS6's lighter valve train and

greatly reduced component inertia. This low inertia allows extraordinarily quick valve acceleration rates. This actually increases the "area beneath the lift curve" in each profile. Simply put, they begin moving the valve off its seat at a much quicker rate, to initiate earlier flow. The profiles retain and lengthen this rate of acceleration during the valve-opening cycle and as it approaches maximum valve lift. They function like a much "bigger" cam (greater duration) yet they increase low-end and mid-range torque in the most often used rpm range. Peak horsepower and torque output are enhanced throughout the entire rpm range. The valve lift tables were also designed to minimize horsepower-robbing

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                    | See pg. 337   | See pg. 350  | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328   | See pg. 317                                      |
|--|---|--|-----------------------|--|---|---|--|
| VALVE SPRING AND RETAINER KITS                 | VALVE SPRINGS   | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY  | — ALUMINUM ROCKERS —<br>GOLD RACE                |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 99831-16 <sup>e</sup><br>144838-16 <sup>g</sup><br>144847-16 <sup>h</sup> | 99637-16 <sup>g</sup><br>99657-16 <sup>h</sup><br>144944-16 <sup>i</sup><br>144661-16 <sup>j</sup> | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |
| 144317-1 <sup>d</sup><br>144316-1 <sup>e</sup> | 144838-16 <sup>g</sup><br>144847-16 <sup>h</sup>                          | 144944-16 <sup>i</sup><br>144661-16 <sup>j</sup>   | 99818-16 <sup>k</sup> | 99108-1 <sup>l</sup><br>99107-1 <sup>m</sup> | 144621-16 <sup>n</sup><br>144622-16 <sup>o</sup><br>95627-16 <sup>p</sup> | 144984-1 <sup>q</sup><br>144985-1 <sup>r</sup><br>144986-1 <sup>u</sup> | 144750-16 <sup>v</sup><br>144759-16 <sup>w</sup> |

- a OE replacement, for use with standard GM alignment bars and standard base circle camshafts.
- b For use with standard GM alignment bars, long body design for up to .715" valve lift and reduced base circle camshafts.
- c Vertical locking bar hydraulic roller lifters, cylinder head removal is required.
- d Contains 144838-16 dual valve springs, 144944-16 steel retainers, 144460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- e Contains 144838-16 dual valve springs, 144661-16 titanium retainers, 14460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- f Single ovate wire beehive valve springs.
- g Dual valve springs for up to .680" lift, requires Crane 144944-16 or 144661-16 retainers, no machining required. 2002-up cylinder heads will require Crane 144460-16 spring seats.
- h Dual valve springs for up to .660" lift, XHTCS material, requires Crane 144944-16 or 144661-16 retainers, no machining required. 2002-up cylinder heads will require Crane 144460-16 spring seats.
- i Titanium, for 99831-16 single valve springs.
- j Titanium, for 99831-16 single valve springs, requires Crane Multi Fit valve locks.
- k Steel, for 144838-16 and 144847-16 dual valve springs.
- l Titanium, for 144838-16 and 144847-16 dual valve springs.
- m No machining required.
- n Machined steel, heat treated.
- o Machined steel, heat treated, Multi Fit.
- p Pro Series one-piece, stock length.
- q Pro Series one-piece, for use with Crane aluminum rocker arm kits (included in 144750-16 and 144759-16 kits).
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- s Pro Series steel billet gears and double roller chain set with vernier adjustment, for LS1 and LS6, without cam sensor trigger.
- t Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for early LS2, with single trigger cam sensor feature.
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- v 1.7 ratio, 3/8" stud, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.
- w 1.8 ratio, 3/8" stud, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.

### COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|------------------------|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b>  |                                  |                       |  |                        |  |   |                               |  |                     |                               |
| Serious Pro Street and Drags, for modified 5.7L thru 8.0L, very rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised, low ratio gearing required, auto trans w/3600-4000 stall converter, serious computer upgrades required.   | R-240/3821-2S-10                 | 3500-7500             | 1448051*                                   | 144511-16 <sup>a</sup> | 240  | 269   | 110                           | 14.5 45.5                                    | .020                | .649                          |
|   |                                  |                       |  | 144570-16 <sup>b</sup> | 244  | 273   | 56.5 7.5                      | .022   | .649                |                               |
|   |                                  |                       |  | 144572-16 <sup>c</sup> |  |   |                               |  |                     |                               |
| Serious Pro Street and Drags, for modified 5.7L thru 8.0L, very rough idle, good with supercharger or nitrous, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised w/o supercharger, low ratio gearing required, auto trans w/3600-4600 stall converter, serious computer upgrades required. | R-242/353-2S-14                  | 3300-7500             | 1448011*                                   | 144511-16 <sup>a</sup> | 242  | 273   | 114                           | 10.5 51.5                                    | .020                | .600                          |
|   |                                  |                       |  | 144570-16 <sup>b</sup> | 248  | 279   | 61.5 6.5                      | .022   | .600                |                               |
|   |                                  |                       |  | 144572-16 <sup>c</sup> |  |   |                               |  |                     |                               |
| Serious Pro Street and Drags, for modified 5.7L thru 8.0L, very rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised, low ratio gearing required, auto trans w/3800-4200 stall converter, serious computer upgrades required.   | R-244/382-2S-10                  | 3600-7600             | 1448061*                                   | 144511-16 <sup>a</sup> | 244  | 273   | 110                           | 16.5 47.5                                    | .020                | .649                          |
|   |                                  |                       |  | 144570-16 <sup>b</sup> | 248  | 277   | 58.5 9.5                      | .022   | .649                |                               |
|   |                                  |                       |  | 144572-16 <sup>c</sup> |  |   |                               |  |                     |                               |
| Serious Pro Street and Drags, for modified 5.7L thru 8.0L, very rough idle, good with supercharger or nitrous, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised w/o supercharger, low ratio gearing required, auto trans w/4000-4800 stall converter, serious computer upgrades required. | R-248/353-2S-10 OA               | 3600-7600             | 1448021*                                   | 144511-16 <sup>a</sup> | 248  | 279   | 110                           | 14 54  | .020                | .600                          |
|   |                                  |                       |  | 144570-16 <sup>b</sup> | 260  | 292   | 60 20                         | .022   | .600                |                               |
|   |                                  |                       |  | 144572-16 <sup>c</sup> |  |   |                               |  |                     |                               |
| Serious Pro Street and Drags, for modified 5.7L thru 8.0L, very rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised, low ratio gearing required, auto trans w/4000-4800 stall converter, serious computer upgrades required.   | R-262/395-2S-8                   | 3800-7800             | 1448031*                                   | 144511-16 <sup>a</sup> | 262  | 296   | 108                           | 27 55  | .020                | .671                          |
|   |                                  |                       |  | 144570-16 <sup>b</sup> | 268  | 302   | 66 22                         | .022   | .671                |                               |
|   |                                  |                       |  | 144572-16 <sup>c</sup> |  |   |                               |  |                     |                               |
| Serious Pro Street and Drags, for modified 5.0L thru 8.0L, very rough idle, upgraded cylinder heads and valvetrain required, headers and aft cat exhaust required, 12.0+ compression ratio advised, low ratio gearing required, auto trans w/5000-5500 stall converter, serious computer upgrades required.   | R-276/420-2-14                   | 4600-8800             | 1448041*                                   | 144511-16 <sup>a</sup> | 276  | 308   | 114                           | 28 68  | .020                | .714                          |
|   |                                  |                       |  | 144570-16 <sup>b</sup> | 286  | 318   | 82 25                         | .022   | .714                |                               |
|   |                                  |                       |  | 144572-16 <sup>c</sup> |  |   |                               |  |                     |                               |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT NOTE:** Crane Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel, it is **HIGHLY RECOMMENDED** that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** 1997-up Chevrolet 5.7L LS1/LS6, 1988-99 305 and 350 V-8 (and some 1987 350 V-8) engines, and the 1957-87 262-400 V-8 engines, each use different configuration camshaft cores, and cannot be interchanged.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

Crane Cams offers many different cam lobe profiles for the GM "LS1/LS2/LS6 Engine Family". These roller cams are designed for applications ranging from Pro Street performance, to all-out competition profiles for LS1 powered race cars.

Crane's roller camshafts are designed to take optimum advantage of the LS1/LS2/LS6's lighter valve train and created reduced component inertia. This low inertia allows extraordinarily

quick valve acceleration rates. This actually increases the "area beneath the lift curve" in each profile. Simply put, these new Crane cams begin moving the valve off its seat at a much quicker rate, to initiate earlier flow. The profile retains and lengthens this rate of acceleration during the valve-opening cycle and as it approaches maximum valve lift. They function like a much "bigger" cam (greater duration) yet they increase low-end and mid-range torque in the most often used rpm range. Peak horsepower and torque output are enhanced throughout the entire rpm range. Crane valve lift tables were also designed to minimize horsepower-robbing harmonic frequency pulses when



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                    | See pg. 337                                      | See pg. 306                                      | See pg. 362           | See pg. 360          | See pg. 306   | See pg. 328   | See pg. 317                                      |
|--|--|--|-----------------------|----------------------|---|---|--|
| VALVE SPRING AND RETAINER KITS                 | VALVE SPRINGS                                    | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY  | — ALUMINUM ROCKERS —<br>GOLD RACE                |
| 144316-1 <sup>d</sup><br>144314-1 <sup>e</sup> | 144838-16 <sup>f</sup><br>144847-16 <sup>g</sup> | 144944-16 <sup>h</sup><br>144661-16 <sup>i</sup> | 99818-16 <sup>j</sup> | 99108-1 <sup>k</sup> | 144621-16 <sup>l</sup><br>144622-16 <sup>m</sup><br>95627-16 <sup>n</sup> | 144984-1 <sup>o</sup><br>144985-1 <sup>p</sup><br>144986-1 <sup>q</sup> | 144750-16 <sup>r</sup><br>144759-16 <sup>s</sup> |
| 144316-1 <sup>d</sup><br>144314-1 <sup>e</sup> | 144838-16 <sup>f</sup><br>144847-16 <sup>g</sup> | 144944-16 <sup>h</sup><br>144661-16 <sup>i</sup> | 99818-16 <sup>j</sup> | 99108-1 <sup>k</sup> | 144621-16 <sup>l</sup><br>144622-16 <sup>m</sup><br>95627-16 <sup>n</sup> | 144984-1 <sup>o</sup><br>144985-1 <sup>p</sup><br>144986-1 <sup>q</sup> | 144750-16 <sup>r</sup><br>144759-16 <sup>s</sup> |
| 144316-1 <sup>d</sup><br>144314-1 <sup>e</sup> | 144838-16 <sup>f</sup><br>144847-16 <sup>g</sup> | 144944-16 <sup>h</sup><br>144661-16 <sup>i</sup> | 99818-16 <sup>j</sup> | 99108-1 <sup>k</sup> | 144621-16 <sup>l</sup><br>144622-16 <sup>m</sup><br>95627-16 <sup>n</sup> | 144984-1 <sup>o</sup><br>144985-1 <sup>p</sup><br>144986-1 <sup>q</sup> | 144750-16 <sup>r</sup><br>144759-16 <sup>s</sup> |
| 144316-1 <sup>d</sup><br>144314-1 <sup>e</sup> | 144838-16 <sup>f</sup><br>144847-16 <sup>g</sup> | 144944-16 <sup>h</sup><br>144661-16 <sup>i</sup> | 99818-16 <sup>j</sup> | 99108-1 <sup>k</sup> | 144621-16 <sup>l</sup><br>144622-16 <sup>m</sup><br>95627-16 <sup>n</sup> | 144984-1 <sup>o</sup><br>144985-1 <sup>p</sup><br>144986-1 <sup>q</sup> | 144750-16 <sup>r</sup><br>144759-16 <sup>s</sup> |
|  |  |  |                       |                      | 144621-16 <sup>l</sup><br>144622-16 <sup>m</sup><br>95627-16 <sup>n</sup> | 144984-1 <sup>o</sup><br>144985-1 <sup>p</sup><br>144986-1 <sup>q</sup> | 144750-16 <sup>r</sup><br>144759-16 <sup>s</sup> |
|  |  |  |                       |                      | 144621-16 <sup>l</sup><br>144622-16 <sup>m</sup><br>95627-16 <sup>n</sup> | 144984-1 <sup>o</sup><br>144985-1 <sup>p</sup><br>144986-1 <sup>q</sup> | 144750-16 <sup>r</sup><br>144759-16 <sup>s</sup> |

- a For use with standard GM alignment bars, long body design for up to .715" valve lift and reduced base circle camshafts.
- b Ultra Pro Series vertical locking bar roller lifters.
- c Ultra Pro Series vertical locking bar roller lifters for Warhawk blocks.
- d Contains 144838-16 dual valve springs, 144661-16 titanium retainers, 144460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- e Contains 144847-16 XHTCS dual valve springs, 144661-16 titanium retainers, 144460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- f Dual valve springs, requires 144661-16 or 144944-16 retainers.
- g Dual XHTCS valve springs, requires 144661-16 or 144944-16 retainers.
- h Steel, for 144838-16 and 144847-16 dual valve springs.
- i Titanium, for 144838-16 and 144847-16 dual valve springs.
- j No machining required.
- k Machined steel, heat treated.
- l Pro Series one-piece, stock length.
- m Pro Series one-piece, for use with Crane aluminum rocker arm kits (included in 144750-16 and 144759-16 kits).
- n Pro Series one piece, stock length -.050".
- o Pro Series steel billet gears and double roller chain set with vernier adjustment, for LS1 and LS6, without cam sensor trigger.
- p Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for early LS2, with single trigger cam sensor feature.
- q Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for late LS2, LS3, LS7, and L92 with four trigger cam sensor feature.
- r 1.7 ratio, 3/8" stud, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.
- s 1.8 ratio, 3/8" stud, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|---------------------|-----------------------|
| <b>Hydraulic Roller Camshafts</b>  |                                  |                       |  |  |  |   |                               |  |                     |                       |
| Good daily driver, for stock or modified LS7, light choppy idle, good fuel economy, 10.5+ compression ratio advised, computer upgrades required, auto trans w/3000-3400 stall converter.   | HR-220/3333-2S1-14 4A            | 2100-6400             | 2039271*                                   | 144536-16 <sup>a</sup><br>144532-16 <sup>b</sup> | 220  | 281   | 114                           | 0 40   | .000                | .600                  |
|  |                                  |                       |  |  | 238  | 299   | 57 1                          | .000   | .600                |                       |
| Weekend driver, for modified LS7, choppy idle, fair fuel economy, headers and aft cat exhaust advised, 11.0+ compression ratio advised, computer upgrades required, auto trans w/3400-3800 stall converter and low ratio gearing required.                                     | HR-224/347-2S2-12 4A             | 2600-6800             | 2039281*                                   | 144536-16 <sup>a</sup><br>144532-16 <sup>b</sup> | 224  | 280   | 112                           | 2.5 41.5                                     | .000                | .625                  |
|  |                                  |                       |  |  | 244  | 299   | 56.5 7.5                      | .000   | .625                |                       |
| Weekend driver, for modified LS7, choppy idle, fair fuel economy, headers and aft cat exhaust advised, 11.0+ compression ratio advised, computer upgrades required, auto trans w/3200-3600 stall converter.  | HR-224/347-2S2-15 4A             | 2300-6800             | 2039291*                                   | 144536-16 <sup>a</sup><br>144532-16 <sup>b</sup> | 224  | 280   | 115                           | (0.5) 44.5                                   | .000                | .625                  |
|  |                                  |                       |  |  | 244  | 299   | 59.5 4.5                      | .000   | .625                |                       |
| Pro Street and Drags, for modified LS7. 1.7 rockers recommended for higher RPM. Choppy to rough idle, headers and aft cat exhaust advised, 11.5+ compression ratio advised, computer upgrades required, auto trans w/3400-4000 stall converter and low ratio gearing required. | HR-228/367-2S1-12 4A             | 2800-7000             | 2039341*                                   | 144536-16 <sup>a</sup><br>144532-16 <sup>b</sup> | 228  | 285   | 112                           | 4.5 43.5                                     | .000                | .661                  |
|  |                                  |                       |  |  | 246  | 303   | 57.5 8.5                      | .000   | .661                |                       |

CAMSHAFTS

# Chevrolet V-8 07-13

## 6.2L LS3/L92/Vortec 6.2 (with three bolt timing gear)

### Hydraulic Roller Camshafts

|  |                     |           |          |                        |     |     |          |            |      |      |
|--|---------------------|-----------|----------|------------------------|-----|-----|----------|------------|------|------|
| Good daily driver, light choppy idle, good fuel economy, computer upgrades required, good w/1.8:1 rocker arms.   | HR-216/347-2S-13 4A | 2000-6000 | 2019371* | 144530-16 <sup>b</sup> | 216 | 272 | 113      | (2.5) 38.5 | .000 | .590 |
|  |                     |           |          | 144536-16 <sup>a</sup> | 232 | 289 | 51.5 0.5 | .000       | .624 |      |
|  |                     |           |          | 144532-16 <sup>c</sup> |     |     |          |            |      |      |
| Daily driver, light choppy idle, fair fuel economy, headers and aft cat exhaust advised, auto trans w/2400-2800 stall converter, computer upgrades required, good w/1.8:1 rocker arms. | HR-220/347-2S-13 4A | 2200-6400 | 2019381* | 144530-16 <sup>b</sup> | 220 | 276 | 113      | (0.5) 40.5 | .000 | .590 |
|  |                     |           |          | 144536-16 <sup>a</sup> | 236 | 293 | 53.5 2.5 | .000       | .624 |      |
|  |                     |           |          | 144532-16 <sup>c</sup> |     |     |          |            |      |      |
| Daily driver, choppy idle, fair fuel economy, headers and aft cat exhaust advised, auto trans w/3000-3400 stall converter, computer upgrades required, good w/1.8:1 rocker arms.       | HR-226/367-2S1-14   | 2600-6000 | 2019391* | 144530-16 <sup>b</sup> | 226 | 283 | 114      | 2.5 43.5   | .000 | .624 |
|  |                     |           |          | 144536-16 <sup>a</sup> | 240 | 297 | 57.5 2.5 | .000       | .624 |      |
|  |                     |           |          | 144532-16 <sup>c</sup> |     |     |          |            |      |      |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel, it is HIGHLY RECOMMENDED that the appropriate Crane valve train components be installed for maximum performance and reliability.

Crane Cams offers many different cam lobe profiles for the GM "LS1/LS2/LS6 Engine Family". These hydraulic roller cams are designed for applications ranging from mild street performance upgrades, serious torque and HP increases for trucks, to all-out competition profiles for LS1 powered race cars.

Crane's LS engine family's grinds are designed to take optimum advantage of the LS1/LS2/LS6's lighter valve train and greatly reduced component inertia. This low inertia allows extraordinarily quick valve acceleration rates. This actually increases the "area beneath the lift curve" in each profile. Simply put, these cams begin moving the valve off its seat at a much quicker rate, to initiate earlier flow, and are stable at higher RPM's. Peak horsepower and torque output are enhanced throughout the entire rpm range. The profiles were also designed to minimize horsepower-robbing harmonic frequency pulses when matched with the recommended Crane valve springs and pushrods.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337            | See pg. 350            | See pg. 362           | See pg. 360          | See pg. 306            | See pg. 328                    | See pg. 312          | See pg. 317            |
|--------------------------------|------------------------|------------------------|-----------------------|----------------------|------------------------|--------------------------------|----------------------|------------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS          | RETAINERS              | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS               | TIMING CHAIN AND GEAR ASSEMBLY | — ALUMINUM ROCKERS — |                        |
|                                |                        |                        |                       |                      |                        |                                |                      | PRO SERIES STUD MOUNT  |
|                                | 99832-16 <sup>f</sup>  | 99976-16 <sup>j</sup>  | 99818-16 <sup>o</sup> | 99107-1 <sup>p</sup> |                        | 144986-1 <sup>u</sup>          |                      |                        |
|                                | 99832-16 <sup>f</sup>  | 99976-16 <sup>j</sup>  | 99818-16 <sup>o</sup> | 99107-1 <sup>p</sup> |                        | 144986-1 <sup>u</sup>          |                      |                        |
|                                | 99832-16 <sup>f</sup>  | 99976-16 <sup>j</sup>  | 99818-16 <sup>o</sup> | 99107-1 <sup>p</sup> |                        | 144986-1 <sup>u</sup>          |                      |                        |
|                                |                        |                        | 99918-16 <sup>o</sup> | 99108-1 <sup>p</sup> |                        | 144986-1 <sup>u</sup>          |                      |                        |
| 144317-1 <sup>d</sup>          | 99831-16 <sup>g</sup>  | 99637-16 <sup>k</sup>  | 99818-16 <sup>o</sup> | 99108-1 <sup>p</sup> | 144621-16 <sup>r</sup> | 144984-1 <sup>v</sup>          |                      | 201750-16 <sup>x</sup> |
| 144316-1 <sup>e</sup>          | 144838-16 <sup>h</sup> | 99657-16 <sup>l</sup>  |                       | 99107-1 <sup>q</sup> | 144622-16 <sup>s</sup> | 144985-1 <sup>w</sup>          |                      | 201759-16 <sup>y</sup> |
|                                | 144847-16 <sup>i</sup> | 144944-16 <sup>m</sup> |                       |                      | 95627-16 <sup>t</sup>  | 144986-1 <sup>u</sup>          |                      |                        |
|                                |                        | 144661-16 <sup>n</sup> |                       |                      |                        |                                |                      |                        |
| 144317-1 <sup>d</sup>          | 99831-16 <sup>g</sup>  | 99637-16 <sup>k</sup>  | 99818-16 <sup>o</sup> | 99108-1 <sup>p</sup> | 144621-16 <sup>r</sup> | 144984-1 <sup>v</sup>          |                      | 201750-16 <sup>x</sup> |
| 144316-1 <sup>e</sup>          | 144838-16 <sup>h</sup> | 99657-16 <sup>l</sup>  |                       | 99107-1 <sup>q</sup> | 144622-16 <sup>s</sup> | 144985-1 <sup>w</sup>          |                      | 201759-16 <sup>y</sup> |
|                                | 144847-16 <sup>i</sup> | 144944-16 <sup>m</sup> |                       |                      | 95627-16 <sup>t</sup>  | 144986-1 <sup>u</sup>          |                      |                        |
|                                |                        | 144661-16 <sup>n</sup> |                       |                      |                        |                                |                      |                        |
| 144317-1 <sup>d</sup>          | 99831-16 <sup>g</sup>  | 99637-16 <sup>k</sup>  | 99818-16 <sup>o</sup> | 99108-1 <sup>p</sup> | 144621-16 <sup>r</sup> | 144984-1 <sup>v</sup>          |                      | 201750-16 <sup>x</sup> |
| 144316-1 <sup>e</sup>          | 144838-16 <sup>h</sup> | 99657-16 <sup>l</sup>  |                       | 99107-1 <sup>q</sup> | 144622-16 <sup>s</sup> | 144985-1 <sup>w</sup>          |                      | 201759-16 <sup>y</sup> |
|                                | 144847-16 <sup>i</sup> | 144944-16 <sup>m</sup> |                       |                      | 95627-16 <sup>t</sup>  | 144986-1 <sup>u</sup>          |                      |                        |
|                                |                        | 144661-16 <sup>n</sup> |                       |                      |                        |                                |                      |                        |

- a OE replacement, for use with standard GM alignment bars and standard base circle camshafts.
- b For use with standard GM alignment bars, long body design for up to .715" valve lift and reduced base circle camshafts.
- c Vertical locking bar hydraulic roller lifters, cylinder head removal is required.
- d Contains 144838-16 dual valve springs, 144944-16 steel retainers, 144460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- e Contains 144838-16 dual valve springs, 144661-16 titanium retainers, 144460-16 spring seats, 99818-16 valve seals, 99108-1 valve locks.
- f Single ovate wire beehive valve springs, 1.450" dia., LS3 and L92 cylinder heads will require machining.
- g Single ovate wire beehive valve springs.
- h Dual valve springs for up to .680" lift, requires Crane 144944-16 or 144661-16 retainers, no machining required. 2002-up cylinder heads will require Crane 144460-16 spring seats.
- i Dual valve springs for up to .660" lift, XHTCS material, requires Crane 144944-16 or 144661-16 retainers, no machining required. 2002-up cylinder heads will require Crane 144460-16 spring seats.
- j Steel, requires Crane Multi Fit valve locks.
- k Titanium, for 99831-16 single valve springs.
- l Titanium, for Crane 99631-16 single valve springs, requires Crane Multi Fit valve locks.
- m Steel, for 144838-16 and 144847-16 dual valve springs.
- n Titanium, for Crane 144838-16 and 144847-16 dual valve springs.
- o No machining required.
- p Machined steel, heat treated, Multi Fit.
- q Machined steel, heat treated.
- r Pro Series one piece, stock length.
- s Pro Series one piece, for use with Crane aluminum rocker arms kits (included in 144750-16 and 144759-16 kits).
- t Pro Series one piece, stock length -.050".
- u Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for late LS2, LS3, LS7, and L92, with four trigger cam sensor features.
- v Pro Series steel billet gears and double roller chain set with vernier adjustment, for LS1 and LS6, without cam sensor trigger.
- w Pro Series steel billet gears and double roller chain set with 9 keyway crank sprocket, for early LS2, with single trigger cam sensor feature.
- x 1.7 ratio, 3/8" stud, for L92/LS3 heads, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.
- y 1.8 ratio, 3/8" stud, for L92/LS3 heads, complete kit includes rocker arms, adjusting nuts, pushrod guideplates, rocker arm studs, and pushrods.

# Chevrolet Big Block V8 Tech Tips & Notes

## 1958-1965 348-409-427 (Z11) V8

Introduced in 1958, the "W" series engines were considered to be Chevrolet's first big block powerplants, referred to as Mark 1 engines within GM. Available in many power levels, from mild truck usage to multiple carbureted performance, they are noted by their offset valves, angled deck surfaces (not perpendicular to the cylinder bores), and having no combustion chambers in the cylinder heads, but instead the "chamber" was contained within the piston domes and cylinder bores. The lifter bores in the block are inline, not canted. This engine family is designated by Crane Cams' 15 prefix.

The camshaft bearing journal diameters are the same as the small block V8 family (1.868"), as is the firing order of 1-8-4-3-6-5-7-2. Engines were offered with camshafts in both hydraulic and mechanical flat faced lifter configurations. Rocker arms are adjustable stamped steel 1.75:1 ratio with ball pivots, mounted on 3/8" studs.

The 427 cu.in. Z11 limited production option was intended for drag racing only, with a unique two-piece aluminum dual four barrel intake manifold. The camshafts and valve train components remained the same basic configuration as the 348-409.

We offer hydraulic, hydraulic roller, mechanical, and mechanical roller camshafts, lifters, and most valve train components, including needle bearing roller tip rocker arms, and heat treated chromemoly tubular pushrods, for these engines. With more aftermarket components becoming available, interest in these engines is increasing, primarily in the restoration, muscle car, and street rod areas.

## 1963 Mark 2 427 V8

The legendary "Mystery Motor" was intended specifically for NASCAR usage, and was an evolution of the W series. The cylinder deck surfaces were made perpendicular to the bores, the combustion chambers are incorporated into the cylinder heads, and the canted valve configuration (called "Porcupine" in the press) was now employed, although the lifter bores were still inline. The camshaft journals remained at 1.868" diameter. The valve layout of the cylinder heads was changed, so special camshafts having a different lobe layout are required.

If you are extremely fortunate enough to have one of these rare pieces, we can custom produce roller camshafts, and supply roller lifters and many other valve train components for it.

## 1967-1990 396-402-427-454 V8

In 1965, the first of the Mark IV engines appeared, in a 396 cu.in. configuration. In 1966, a 427 cu.in version was added. The cylinder blocks were completely different from the earlier W series, with staggered lifter bores and larger camshaft journals (1.948"). The canted valve cylinder heads were now incorporated into production. The rocker arm ratio of the adjustable stamped steel units is 1.7:1. This engine is referred by Crane Cams' 13 prefix for camshafts and compo-

nents. Additional displacement versions were added throughout the years, with production line vehicle installation of the Mark IV engines ceasing in 1995 (including the Gen V iteration).

One unique feature of the camshafts used only in the 1965 and 1966 engines, was the oil groove machined into the center of the rear cam journal (3/16" wide and 7/64" deep). This was required to supply the lifter galleries and top end of the engine with oil. This was revised in 1967 by changing the machining configuration on the blocks where the rear cam bearing presses in. A different rear cam bearing was used, and the camshaft no longer required the groove. Due to a performance magazine article published in the late 1960's, an urban legend appeared (and continues today), stating if you used an early grooved camshaft in a later engine, a massive internal oil leak would occur. This is not true, there is no problem using a 1965-1966 type grooved cam in a later block. If you do have an early block with its original configuration cam bearings, the camshaft must have the groove in the rear journal. This option is available from us on request.

The Mark IV engines were equipped from the factory with camshafts having either hydraulic or mechanical flat faced lifter configurations. Certain industrial and marine versions had gear drive, reverse rotation, and gear drive reverse rotation camshafts installed. Make sure of exactly what camshaft your application requires if you have other than a standard rotation, conventional timing chain drive engine.

We offer cast hydraulic and mechanical lifter camshafts with standard bearing journals having the standard firing order (1-8-4-3-6-5-7-2) and also the optional SFO suffix firing order (1-8-7-3-6-5-4-2).

Crane Cams' retrofit hydraulic roller and mechanical roller camshafts are produced in house from steel billet material, heat treated, and finish ground in a variety of versions.

Our retrofit hydraulic roller lifters do not require any block machining, are a drop-in configuration, and incorporate a vertical locking bar. Mechanical roller lifters are also drop-in, and are available in both horizontal and vertical locking bar versions. In 2005 we increased the bar height of our roller lifters, so that most of today's blocks having taller than stock lifter bosses should have sufficient locking bar to block clearance (the height of the pushrod seat did not change). This should always be checked prior to final assembly, as machining variances in the blocks and different camshaft base circle diameters may result in unwanted contact.

For street and endurance applications, we offer hydraulic and mechanical roller camshafts equipped with a cast iron distributor drive gear and rear journal installed on the steel camshaft. These are noted by an IG suffix (Iron Gear), allowing the use of a standard type distributor gear for long term reliability.

There are a number of journal size options available for the roller camshafts, including: Standard (1.948"); Roller Bearing (1.968"/50mm) – RB suffix; Big Bearing (2.125") – BB suffix; 55mm (2.165") – 55J suffix; 60mm (2.362") – 60J suffix.

Other sizes are available on request. Camshafts having larger than stock journals incorporate a step ground on the front journal, so that a standard size camshaft sprocket can be used.

Standard firing order (1-8-4-3-6-5-7-2) and SFO (1-8-7-3-6-5-4-2) firing order hydraulic roller and mechanical roller camshafts are offered, along with other custom options for 180 degree crankshafts and other unique situations.

In some applications where large diameter camshafts are being used, this may result in the lifter sitting too high in the lifter bore for proper oiling to occur. We currently offer specific roller lifters to maintain proper oil flow. Check the Roller Lifter pages for part numbers and applications.

Drilling and tapping the rear cam journal for the Sander accessory drive is offered (RD suffix), as is gun drilling the camshaft for lightness and reduced torsional deflection (DR suffix).

### 1991-1995 Gen V 454 V8

This is one of the more misunderstood variations of the basic Mark IV engine configuration. During these years, Chevrolet was offering the Gen V 454 just about exclusively in truck applications, with some marine use occurring. The engine block was updated for provisions to install a camshaft thrust plate, and hydraulic roller lifter guidebars, although a hydraulic camshaft and flat faced lifters were installed. The front of the camshaft was slightly stepped down at the front, requiring a special cam sprocket, but the normal cam bolt pattern was retained. Some of these blocks had provisions for a mechanical fuel pump, while others did not. The rocker arms were no longer adjustable, as a stepped stud net-lash system was employed.

At this time, a number of different aftermarket engine suppliers began offering their own iterations of the Mark IV, which they sometimes called the "Mark V", but were not the same as the factory items. These were basically engines assembled from Mark IV type OEM or aftermarket components, and could be loosely thought of as independently continued Mark IV production. Caution needs to be used when ordering replacement components for these engines, as they could become confused with the factory Gen V items.

Most of our 13 prefix camshafts and components as used in the Mark IV engines can be applied to the Gen V. A Mark IV style timing set will be required. We offer special rocker arm studs, **99152-16**, that will thread into the Gen V cylinder heads, 3/8" - 16 on the bottom, with a conventional 7/16" - 20 threaded top, permitting the use of adjustable Mark IV type rocker arms, while using the Gen V pushrod guideplates.

The availability of aftermarket components and complete engines for the now legendary Big Block, in it's many versions, assures it's popularity for some time to come. Crane Cams will continue to produce new product offerings for this very prolific powerplant.

### 1996-2000 Gen VI 454 (7.4L) - 502 (8.2L) V8

The upgrades that Chevrolet hinted at in the Gen V engine, achieved production status in the Gen VI. This engine family is designated by Crane Cams' 16 prefix camshafts and components. A hydraulic roller camshaft was installed, incorporating a reduced diameter bolt pattern on the stepped journal front, accommodating the installed thrust plate, and hydraulic roller lifters were now standard equipment. A new timing set was required for the new configuration camshaft, and reduced depth under the standard front cover allowed room for only a single row roller timing chain. There is no provision for a mechanical fuel pump. The rocker arms were still the non-adjustable net-lash style, which could again be converted to an adjustable configuration by using our **99152-16** rocker arm studs and Mark IV type rocker arms. Cam bearing diameter was maintained at 1.948", as was the 1-8-4-3-6-5-7-2 firing order.

We offer steel billet hydraulic roller and mechanical roller camshafts that incorporate the Cast Iron distributor drive gear and rear camshaft journal (IG suffix) for these engines. Left Hand rotation camshafts for marine applications are also available.

Versions of these basic engines continue to be available through the GM Performance Parts catalog, equipped with various cylinder head combinations. Gen V blocks with Mark IV type heads being a popular assembly. Be sure of what components are needed when ordering.

### 2001-2008 8.1L (Vortec 8100) V8

What appears to be the final factory production Big Block, received additional upgrades in its latest version. This is a distributorless engine, incorporating a new hydraulic roller camshaft (having a 1-8-7-2-6-5-4-3 firing order), new timing set (incorporating a cam position sensor), relocated lifter oil galleries, and a different net lash rocker arm system (with the cylinder heads now tapped with 10mm threads). Our 26 prefix is used for these camshafts and components.

Crane Cams' steel billet hydraulic roller camshafts for these engines are equipped with cast iron distributor drive gears and rear journals (IG suffix) for oil pump drive gear compatibility. The 26 and 16 prefix (Gen VI) camshafts can be interchanged, with appropriate engine changes required for their different firing orders.

Due to the relocated lifter oil galleries, different lifters are required. We offer our steel billet bodied **26535-16** hydraulic roller lifters for use with the factory alignment bars to allow the use of higher than stock lift camshafts.

The rocker arms can be converted to an adjustable configuration by using our **99155-16** rocker arm studs. These have 10mm threads on the bottom, and 7/16" - 20 on the top, for use with the Mark IV style rocker arms.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |                 |  |   |                               |  |                             |                               |
| Brute low end torque, smooth idle, daily usage, towing, economy, 348 pickup special, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.   | <b>H-200/2717-2-10</b>           | 800-4400              | <b>150061</b>                              | <b>99277-16</b> | 200<br>210                                 | 264<br>274                                    | 110                           | (5) 25<br>40 (10)                            | .000<br>.000                | .475<br>.502                  |
|  |                                  |                       | ⚡  |                 |  |   |                               |  |                             |                               |
| Good low and mid range torque, good idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, 9.0 to 10.5 compression ratio advised.   | <b>H-218/300-2S-12</b>           | 1800-5400             | <b>150291</b>                              | <b>99277-16</b> | 218<br>230                                 | 288<br>300                                    | 112                           | 2 36<br>52 (12)                              | .000<br>.000                | .525<br>.543                  |
|  |                                  |                       | ⚡  |                 |  |   |                               |  |                             |                               |
| Good mid range torque, fair idle, moderate performance usage, good mid-range HP, hydraulic substitute for 409 HP mechanical camshaft, 3200-3600 cruise RPM, 9.5 to 11.0 compression ratio advised.   | <b>H-224/3090-2-12</b>           | 2200-6000             | <b>150301</b>                              | <b>99277-16</b> | 224<br>234                                 | 294<br>304                                    | 112                           | 5 39<br>54 0                                 | .000<br>.000                | .541<br>.569                  |
|  |                                  |                       | ⚡  |                 |  |   |                               |  |                             |                               |
| Fair idle, moderate performance usage, good mid and upper RPM torque and HP, hydraulic substitute for 425 HP mechanical camshaft, 3600-4000 cruise RPM, 10.0 to 11.5 compression ratio advised.  | <b>H-230/3101-2S-14</b>          | 2800-6400             | <b>150311</b>                              | <b>99277-16</b> | 230<br>234                                 | 292<br>296                                    | 114                           | 6 44<br>56 (2)                               | .000<br>.000                | .543<br>.551                  |
|  |                                  |                       | ⚡  |                 |  |   |                               |  |                             |                               |
| Moderate performance usage, rough idle, good mid and upper RPM torque and HP, bracket racing, auto trans w/2500+ converter, 3800-4200 cruise RPM, good for increased displacement stroked engines, 10.5 to 12.0 compression ratio advised. | <b>H-236/325-2-10</b>            | 3000-6000             | <b>150171</b>                              | <b>99277-16</b> | 236<br>246                                 | 296<br>306                                    | 110                           | 13 43<br>58 0                                | .000<br>.000                | .569<br>.588                  |
|  |                                  |                       | ⚡  |                 |  |   |                               |  |                             |                               |
| <b>Hydraulic Roller Camshafts — Retrofit</b>   |                                  |                       |  |                 |  |   |                               |  |                             |                               |
| Good idle, excellent low end torque and HP, daily performance usage, 2600-3400 cruise RPM, 9.0 to 10.5 compression ratio advised.  | <b>HR-218/332-2S-10</b>          | 1600-5600             | <b>159511<sup>a</sup></b>                  | <b>11532-16</b> | 218<br>226                                 | 280<br>288                                    | 110                           | 4 34<br>48 (2)                               | .000<br>.000                | .581<br>.604                  |
|  |                                  |                       | ⚡  |                 |  |   |                               |  |                             |                               |
| Fair idle, moderate performance usage, good mid range torque and HP, auto trans w/2000+ converter, 3000-3800 cruise RPM, 9.5 to 11.0 compression ratio advised.  | <b>HR-224/319-2S-10</b>          | 2000-6000             | <b>159521<sup>a</sup></b>                  | <b>11532-16</b> | 224<br>230                                 | 280<br>286                                    | 110                           | 7 37<br>50 0                                 | .000<br>.000                | .558<br>.574                  |
|  |                                  |                       | ⚡  |                 |  |   |                               |  |                             |                               |
| Fair idle, performance usage, good mid-range torque and HP, 3600-4400 cruise RPM, 10.0 to 11.5 compression ratio advised.  | <b>HR-230/352-2S-12</b>          | 2600-6600             | <b>159531<sup>a</sup></b>                  | <b>11532-16</b> | 230<br>234                                 | 292<br>296                                    | 112                           | 8 42<br>54 0                                 | .000<br>.000                | .616<br>.628                  |
|  |                                  |                       | ⚡  |                 |  |   |                               |  |                             |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.  
**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

CAMSHAFTS

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**









| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360          | See pg. 306                                    | See pg. 328                    | See pg. 312       | See pg. 315   | See pg. 317                                    |
|--------------------------------|-----------------------|-------------|-----------------------|----------------------|--|--------------------------------|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 96873-16 <sup>b</sup> | 99957-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>h</sup><br>13744-16 <sup>i</sup>      | 15750-16 <sup>j</sup><br>13750-16 <sup>k</sup> |
|                                | 96873-16 <sup>b</sup> | 99957-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>h</sup><br>13744-16 <sup>i</sup>      | 15750-16 <sup>j</sup><br>13750-16 <sup>k</sup> |
|                                | 96873-16 <sup>b</sup> | 99957-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>h</sup><br>13744-16 <sup>i</sup>      | 15750-16 <sup>j</sup><br>13750-16 <sup>k</sup> |
|                                | 96873-16 <sup>b</sup> | 99957-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>h</sup><br>13744-16 <sup>i</sup>      | 15750-16 <sup>j</sup><br>13750-16 <sup>k</sup> |
|                                | 96873-16 <sup>b</sup> | 99957-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>h</sup><br>13744-16 <sup>i</sup>      | 15750-16 <sup>j</sup><br>13750-16 <sup>k</sup> |
|                                | 96873-16 <sup>b</sup> | 99969-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15630-16 <sup>f</sup><br>15640-16 <sup>g</sup> |                                |                   | 13774-16 <sup>h</sup><br>13744-16 <sup>i</sup>      | 15750-16 <sup>j</sup><br>13750-16 <sup>k</sup> |
|                                | 96873-16 <sup>b</sup> | 99969-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15630-16 <sup>f</sup><br>15640-16 <sup>g</sup> |                                |                   | 13774-16 <sup>h</sup><br>13744-16 <sup>i</sup>      | 15750-16 <sup>j</sup><br>13750-16 <sup>k</sup> |
|                                | 96873-16 <sup>b</sup> | 99969-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15630-16 <sup>f</sup><br>15640-16 <sup>g</sup> |                                |                   | 13774-16 <sup>h</sup><br>13744-16 <sup>i</sup>      | 15750-16 <sup>j</sup><br>13750-16 <sup>k</sup> |

- a Requires cam button spacer and 11990-1 aluminum-bronze distributor drive gear
- b Must machine cylinder heads
- c Machined steel, heat treated
- d 5/16" diameter, heavy wall, heat treated
- e 3/8" diameter, heavy wall, heat treated
- f Pro Series one-piece, 5/16" diameter
- g Pro Series one-piece, 3/8" diameter

- h Crane Classic extruded 1.7 ratio, 7/16" stud
- i Energizer 1.7 ratio, 7/16" stud
- j 1.7 ratio, 3/8" stud
- k 1.7 ratio, 7/16" stud

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code  | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|---|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Lifter Camshafts</b>  |                                  |                       |   |                 |  |   |                               |  |                             |                               |
| Excellent low and mid range torque, good idle, daily usage, 2800-3400 cruise RPM, 8.5 to 9.75 compression ratio advised.  | <b>F-228/3067-2-10</b>           | 2500-5800             | <b>150811*</b>  | <b>99250-16</b> | 228<br>238                                 | 268<br>278                                    | 110                           | 9 39<br>54 4                                 | .022<br>.022                | .537<br>.560                  |
|   |                                  |                       |    |                 |  |   |                               |  |                             |                               |
| Replacement for Factory Mark IV 409 HP 409 cu.in. camshaft.   | <b>BluePrinted<br/>3796077</b>   | 3000-6200             | <b>150421</b>   | <b>99250-16</b> | 234<br>234                                 | 280<br>280                                    | 116.5                         | (.5) 54.5<br>52.5 1.5                        | .018<br>.022                | .434<br>.434                  |
|   |                                  |                       |    |                 |  |   |                               |  |                             |                               |
| Replacement for Factory Mark VI 425 HP 409 cu.in. camshaft.   | <b>BluePrinted<br/>3830690</b>   | 3200-6500             | <b>150431</b>   | <b>99250-16</b> | 237<br>241                                 | 274<br>281                                    | 113.5                         | 5 52<br>54 7                                 | .022<br>.030                | .504<br>.515                  |
|   |                                  |                       |    |                 |  |   |                               |  |                             |                               |
| Replacement for Factory Mark VII 430 HP Z-11 camshaft.  | <b>BluePrinted<br/>3837735</b>   | 3800-7000             | <b>150441</b>   | <b>99250-16</b> | 250<br>250                                 | 296<br>296                                    | 113.5                         | 11.5 58.5<br>58.5 11.5                       | .030<br>.030                | .555<br>.555                  |
|   |                                  |                       |    |                 |  |   |                               |  |                             |                               |
| Performance usage, good mid and upper RPM torque and HP, bracket racing, auto trans w/3000+ converter, 11.5 minimum compression ratio advised.  | <b>F-256/3412-2-10</b>           | 3800-7200             | <b>151341*</b>  | <b>99250-16</b> | 256<br>266                                 | 292<br>302                                    | 110                           | 21 55<br>66 20                               | .026<br>.026                | .617<br>.634                  |
|   |                                  |                       |    |                 |  |   |                               |  |                             |                               |
| <b>Mechanical Roller Camshafts</b>  |                                  |                       |   |                 |  |   |                               |  |                             |                               |
| Good low and mid range torque, fair idle, moderate performance usage, 3200-3600 cruise RPM, auto trans w/2000+ converter, 10.5 to 11.5 compression ratio advised.                       | <b>SR-236/350-2S-12</b>          | 2600-5800             | <b>158511<sup>a</sup></b>   | <b>15519-16</b> | 236<br>244                                 | 286<br>294                                    | 112                           | 11 45<br>59 5                                | .020<br>.020                | .613<br>.634                  |
|   |                                  |                       |  |                 |  |   |                               |  |                             |                               |
| Good mid range torque and HP, fair idle, performance usage, bracket racing, auto trans w/2500+ converter, 11.0 to 12.0 compression ratio advised.                                       | <b>SR-244/362-2S-10</b>          | 3000-6200             | <b>158171<sup>a</sup></b>   | <b>15519-16</b> | 244<br>252                                 | 294<br>302                                    | 110                           | 17 47<br>61 11.5                             | .020<br>.020                | .634<br>.655                  |
|   |                                  |                       |  |                 |  |   |                               |  |                             |                               |
| Good upper RPM torque and HP, performance usage, bracket racing, auto trans w/3500+ converter, good for increased displacement stroked engines, 11.5 minimum compression ratio advised. | <b>SR-252/374-2S-12</b>          | 3400-6800             | <b>158711<sup>a</sup></b>   | <b>15519-16</b> | 252<br>260                                 | 302<br>310                                    | 112                           | 19 53<br>67 13                               | .020<br>.020                | .655<br>.655                  |
|   |                                  |                       |  |                 |  |   |                               |  |                             |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.  
**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360          | See pg. 306                                    | See pg. 328                    | See pg. 312       | See pg. 317                        | See pg. 317                                    |
|--------------------------------|-----------------------|-------------|-----------------------|----------------------|--|--------------------------------|-------------------|------------------------------------|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ENERGIZER | ROCKERS — GOLD RACE                            |
|                                | 96873-16 <sup>b</sup> | 99957-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>f</sup>              | 15750-16 <sup>g</sup><br>13750-16 <sup>h</sup> |
|                                | 96873-16 <sup>b</sup> | 99957-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>f</sup>              | 15750-16 <sup>g</sup><br>13750-16 <sup>h</sup> |
|                                | 96873-16 <sup>b</sup> | 99957-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>f</sup>              | 15750-16 <sup>g</sup><br>13750-16 <sup>h</sup> |
|                                | 96873-16 <sup>b</sup> | 99957-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>f</sup>              | 15750-16 <sup>g</sup><br>13750-16 <sup>h</sup> |
|                                | 96873-16 <sup>b</sup> | 99957-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>f</sup>              | 15750-16 <sup>g</sup><br>13750-16 <sup>h</sup> |
|                                | 96870-16 <sup>b</sup> | 99969-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>f</sup>              | 15750-16 <sup>g</sup><br>13750-16 <sup>h</sup> |
|                                | 96870-16 <sup>b</sup> | 99969-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>f</sup>              | 15750-16 <sup>g</sup><br>13750-16 <sup>h</sup> |
|                                | 96870-16 <sup>b</sup> | 99969-16    | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 15621-16 <sup>d</sup><br>15634-16 <sup>e</sup> |                                |                   | 13774-16 <sup>f</sup>              | 15750-16 <sup>g</sup><br>13750-16 <sup>h</sup> |

**a** Requires cam button spacer and **11990-1** aluminum-bronze distributor drive gear  
**b** Must machine cylinder heads  
**c** Machined steel, heat treated  
**d** 5/16" diameter, heavy wall, heat treated

**e** 3/8" diameter, heavy wall, heat treated  
**f** Crane Classic extruded 1.7 ratio, 7/16" stud  
**g** 1.7 ratio, 3/8" stud  
**h** 1.7 ratio, 7/16" stud

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code             | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |  |  |   |                               |  |                     |                               |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1200-2000 cruise RPM, 8.0 to 9.25 compression ratio advised.   | <b>H-248-2</b>                   | 600-4200              | <b>133971</b>  | <b>99277-16</b>                                | 192<br>204                                 | 248<br>260                                    | 110                           | (9) 21<br>37 (13)                            | .000<br>.000        | .453<br>.484                  |
|  |                                  |                       | ◆  |  |  |   |                               |  |                     |                               |
| Improves torque and HP throughout entire power range. Proven for towing in Dualies, Crew Cabs, SS454s and Suburbans. (50 state legal, 94 and earlier, C.A.R.B. E.O. D-225-51).   | <b>2020</b>                      | 800-4400              | <b>134112<sup>a</sup></b>                              | <b>99277-16</b>                                | 202<br>210                                 | 262<br>270                                    | 110                           | (4) 26<br>40 (10)                            | .000<br>.000        | .468<br>.485                  |
|  |                                  |                       | ◆  |  |  |   |                               |  |                     |                               |
| Brute low end torque, smooth idle, daily usage, off road, towing, 1600-2200 cruise RPM, 8.0 to 9.5 compression ratio advised.  | <b>Energizer<br/>260 H10</b>     | 1000-4500             | <b>10303<sup>*</sup></b><br><b>103032<sup>tb</sup></b> | <b>99277-16</b>                                | 204<br>204                                 | 260<br>260                                    | 110                           | (3) 27<br>37 (13)                            | .000<br>.000        | .484<br>.484                  |
|  |                                  |                       | ◆  |  |  |   |                               |  |                     |                               |
| Excellent low end torque and HP, smooth idle, daily usage, off road, towing, economy, also mild turbo-charged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised. (50 state legal, 94 and earlier, C.A.R.B. E.O. D-225-51).   | <b>H-260-2</b>                   | 1000-4800             | <b>133901</b><br><b>133902<sup>a</sup></b>             | <b>99277-16</b>                                | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000        | .484<br>.515                  |
|  |                                  |                       | ◆  |  |  |   |                               |  |                     |                               |
| Good low end torque and HP, smooth idle, daily usage, fuel economy, light towing, off road, 2200-2700 cruise RPM, 8.5 to 10.0 compression ratio advised.   | <b>Energizer<br/>266 H10</b>     | 1200-4800             | <b>10304<sup>*</sup></b><br><b>103042<sup>tb</sup></b> | <b>99277-16</b>                                | 210<br>210                                 | 266<br>266                                    | 110                           | 0 30<br>40 (10)                              | .000<br>.000        | .499<br>.499                  |
|  |                                  |                       | ◆  |  |  |   |                               |  |                     |                               |
| Primarily for SS454, increased mid range to top-end HP and torque, especially 3500 RPM and up, slight decrease below 2500 RPM in stock engine. Excellent with aftermarket intake, performance heads, headers and free-flow exhaust. Good idle, daily usage, off road, towing, economy, good low and mid range torque and HP, 2400-2800 cruise RPM 8.5 to 10.0 compression ratio advised. (50 state legal, 94 and earlier, C.A.R.B. E.O. D-225-51). | <b>2030</b>                      | 1200-5000             | <b>133931</b><br><b>134122<sup>a</sup></b>             | <b>99277-16</b>                                | 210<br>218                                 | 266<br>274                                    | 114                           | (4) 34<br>48 (10)                            | .000<br>.000        | .485<br>.502                  |
|  |                                  |                       | ◆  |  |  |   |                               |  |                     |                               |
| Replacement for factory 350 HP 396 cu.in. camshaft.  | <b>BluePrinted<br/>3883986</b>   | 1200-4600             | <b>969391</b>  | <b>99277-16</b>                                | 214<br>218                                 |   | 115                           | (3) 37<br>49 (11)                            | .000<br>.000        | .461<br>.480                  |
|  |                                  |                       | ◆  |  |  |   |                               |  |                     |                               |
| Good mid range torque and HP, good idle, daily usage, off road, highway towing, fuel efficiency plus performance, 2600-3000 cruise RPM, 8.75 to 10.0 compression ratio advised.  | <b>Energizer<br/>272 H10</b>     | 1400-5000             | <b>10305<sup>*</sup></b><br><b>103052<sup>tb</sup></b> | <b>99277-16</b>                                | 216<br>216                                 | 272<br>272                                    | 110                           | 3 33<br>43 (7)                               | .000<br>.000        | .515<br>.515                  |
|  |                                  |                       | ◆  |  |  |   |                               |  |                     |                               |
| Excellent mid range torque and HP, good idle, daily usage and off road, towing, performance and fuel efficiency, good w/small plate nitrous system, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised. Good w/centrifugal or small Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised.  | <b>H-272-2</b>                   | 1600-5400             | <b>133941<sup>*</sup></b><br><b>133942<sup>a</sup></b> | <b>99277-16</b><br><b>99377-16<sup>c</sup></b> | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000        | .515<br>.510                  |
|  |                                  |                       | ◆  |  |  |   |                               |  |                     |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT NOTE:** 1991-95 Gen V engines can use these camshafts and components if lifter preload is checked, or if converted to use adjustable rocker arms by installing **99152-16** rocker arm studs (no machining required) and appropriate rocker arms.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16"

**NOTE:** Camshafts with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap), are available on special order. Contact Crane's Performance Consultants for details. **IMPORTANT NOTE:** Some 1973 thru 1981 454 cu.in. engines were equipped with exhaust valve rotators. In these instances when using dual valve springs, use either our **99459-8** Spring Seat Spacers or 4 of **99948-2** valve spring retainers (on the exhaust valves only) to prevent excessive valve spring shimming when eliminating the rotators. Some later engines were equipped with rotators on both

the intake and exhaust valves. For these applications when using dual valve springs, use either 2 of our **99459-8** Spring Seat Spacers or our **99948-16** valve spring retainers to prevent excessive valve spring shimming when eliminating the rotators.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                                  | See pg. 337                                    | See pg. 350                       | See pg. 362      | See pg. 360          | See pg. 306                                    | See pg. 328  | See pg. 312             | See pg. 315   | See pg. 317  |
|--|--|-----------------------------------|------------------|----------------------|--|--|-------------------------|---|--|
| VALVE SPRING AND RETAINER KITS               | VALVE SPRINGS                                  | RETAINERS                         | VALVE STEM SEALS | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS       | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
| 13308-1 <sup>d</sup><br>13309-1 <sup>e</sup> | 99839-16 <sup>d</sup><br>96801-16 <sup>e</sup> | 99948-16<br>99957-16 <sup>f</sup> |                  | 99098-1 <sup>g</sup> | 13634-16 <sup>h</sup><br>13640-16 <sup>i</sup> | 13975-1 <sup>j</sup><br>13984-1 <sup>k</sup><br>13977-1 <sup>l</sup> | 13800-16 <sup>m,n</sup> | 13774-16 <sup>n,o</sup><br>13744-16 <sup>n,p</sup>  | 13750-16 <sup>q,r</sup><br>13763TR-16 <sup>q,r</sup> |
| 13308-1 <sup>d</sup><br>13309-1 <sup>e</sup> | 99839-16 <sup>d</sup><br>96801-16 <sup>e</sup> | 99948-16<br>99957-16 <sup>f</sup> |                  | 99098-1 <sup>g</sup> | 13634-16 <sup>h</sup><br>13640-16 <sup>i</sup> | 13975-1 <sup>j</sup><br>13984-1 <sup>k</sup><br>13977-1 <sup>l</sup> | 13800-16 <sup>m,n</sup> | 13774-16 <sup>n,o</sup><br>13744-16 <sup>n,p</sup>  | 13750-16 <sup>q,r</sup><br>13763TR-16 <sup>q,r</sup> |
| 13308-1 <sup>d</sup><br>13309-1 <sup>e</sup> | 99839-16 <sup>d</sup><br>96801-16 <sup>e</sup> | 99948-16<br>99957-16 <sup>f</sup> |                  | 99098-1 <sup>g</sup> | 13634-16 <sup>h</sup><br>13640-16 <sup>i</sup> | 13975-1 <sup>j</sup><br>13984-1 <sup>k</sup><br>13977-1 <sup>l</sup> | 13800-16 <sup>m,n</sup> | 13774-16 <sup>n,o</sup><br>13744-16 <sup>n,p</sup>  | 13750-16 <sup>q,r</sup><br>13763TR-16 <sup>q,r</sup> |
| 13308-1 <sup>d</sup><br>13309-1 <sup>e</sup> | 99839-16 <sup>d</sup><br>96801-16 <sup>e</sup> | 99948-16<br>99957-16 <sup>f</sup> |                  | 99098-1 <sup>g</sup> | 13634-16 <sup>h</sup><br>13640-16 <sup>i</sup> | 13975-1 <sup>j</sup><br>13984-1 <sup>k</sup><br>13977-1 <sup>l</sup> | 13800-16 <sup>m,n</sup> | 13774-16 <sup>n,o</sup><br>13744-16 <sup>n,p</sup>  | 13750-16 <sup>q,r</sup><br>13763TR-16 <sup>q,r</sup> |
| 13308-1 <sup>d</sup><br>13309-1 <sup>e</sup> | 99839-16 <sup>d</sup><br>96801-16 <sup>e</sup> | 99948-16<br>99957-16 <sup>f</sup> |                  | 99098-1 <sup>g</sup> | 13634-16 <sup>h</sup><br>13640-16 <sup>i</sup> | 13975-1 <sup>j</sup><br>13984-1 <sup>k</sup><br>13977-1 <sup>l</sup> | 13800-16 <sup>m,n</sup> | 13774-16 <sup>n,o</sup><br>13744-16 <sup>n,p</sup>  | 13750-16 <sup>q,r</sup><br>13763TR-16 <sup>q,r</sup> |
| 13308-1 <sup>d</sup><br>13309-1 <sup>e</sup> | 99839-16 <sup>d</sup><br>96801-16 <sup>e</sup> | 99948-16<br>99957-16 <sup>f</sup> |                  | 99098-1 <sup>g</sup> | 13634-16 <sup>h</sup><br>13640-16 <sup>i</sup> | 13975-1 <sup>j</sup><br>13984-1 <sup>k</sup><br>13977-1 <sup>l</sup> | 13800-16 <sup>m,n</sup> | 13774-16 <sup>n,o</sup><br>13744-16 <sup>n,p</sup>  | 13750-16 <sup>q,r</sup><br>13763TR-16 <sup>q,r</sup> |
| 13308-1 <sup>d</sup><br>13309-1 <sup>e</sup> | 99839-16 <sup>d</sup><br>96801-16 <sup>e</sup> | 99948-16<br>99957-16 <sup>f</sup> |                  | 99098-1 <sup>g</sup> | 13634-16 <sup>h</sup><br>13640-16 <sup>i</sup> | 13975-1 <sup>j</sup><br>13984-1 <sup>k</sup><br>13977-1 <sup>l</sup> | 13800-16 <sup>m,n</sup> | 13774-16 <sup>n,o</sup><br>13744-16 <sup>n,p</sup>  | 13750-16 <sup>q,r</sup><br>13763TR-16 <sup>q,r</sup> |
| 13308-1 <sup>d</sup><br>13309-1 <sup>e</sup> | 99839-16 <sup>d</sup><br>96801-16 <sup>e</sup> | 99948-16<br>99957-16 <sup>f</sup> |                  | 99098-1 <sup>g</sup> | 13634-16 <sup>h</sup><br>13640-16 <sup>i</sup> | 13975-1 <sup>j</sup><br>13984-1 <sup>k</sup><br>13977-1 <sup>l</sup> | 13800-16 <sup>m,n</sup> | 13774-16 <sup>n,o</sup><br>13744-16 <sup>n,p</sup>  | 13750-16 <sup>q,r</sup><br>13763TR-16 <sup>q,r</sup> |
| 13308-1 <sup>d</sup><br>13309-1 <sup>e</sup> | 99839-16 <sup>d</sup><br>96801-16 <sup>e</sup> | 99948-16<br>99957-16 <sup>f</sup> |                  | 99098-1 <sup>g</sup> | 13634-16 <sup>h</sup><br>13640-16 <sup>i</sup> | 13975-1 <sup>j</sup><br>13984-1 <sup>k</sup><br>13977-1 <sup>l</sup> | 13800-16 <sup>m,n</sup> | 13774-16 <sup>n,o</sup><br>13744-16 <sup>n,p</sup>  | 13750-16 <sup>q,r</sup><br>13763TR-16 <sup>q,r</sup> |

Section Continued

- a Cam and Lifter Kit, includes installation lubricants and Cam Sprocket Bolt Locking Plate.
- b Cam and Lifter Kit, includes assembly lubricant.
- c Optional Hi Intensity hydraulic lifters, see page 292 for details.
- d Contains standard diameter valve springs, no machining required. **NOTE:** 1980 and later truck 366, 402, 427 and 454 engines have a short valve spring assembly height and should use **99837-16** standard diameter valve springs and **99957-16** retainers, contained in **13309-1** spring and retainer kit.
- e For 1980-95 truck 366, 402, 427 and 454 engines with short valve spring assembly height, contains standard diameter valve springs.
- f For 1980-95 truck 366, 402, 427 and 454 engines with short valve spring assembly height.
- g Machined steel, heat treated.
- h Heavy wall, heat treated, 3/8" diameter.
- i Pro Series one-piece, 3/8" diameter.
- j Performance steel billet gears and roller chain set.
- k Pro Series steel billet gears and roller chain set.
- l Pro Series steel billet gears and roller chain set with thrust bearing.
- m 1.7 ratio, 3/8" stud, long slot for 1.560" maximum O.D. valve springs.
- n 1991-95 engines require the installation of **99152-16** 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
- o Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- p Energizer, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- q 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- r 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number                 | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code                                | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|---|--|-----------------------|---|--|--|---|-------------------------------|--|---------------------|-------------------------------|
| Good mid range torque and HP, fair idle, performance usage, serious off road, mild bracket racing w/heavy car, 9.5 to 10.75 compression ratio advised.  | <b>H-222/3114-251-8</b>                          | 1800-<br>5600         | <b>130201*</b>  | <b>99277-16</b>                                | 222  | 278   | 108                           | 8 34   | .000                | .529                          |
|   |  |                       |   |  | 234  | 290   | 50 4                          | .000   | .525                |                               |
| Good mid range torque and HP, good idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, marine applications, primarily used in up to 350 HP near-stock engines for mild performance applications w/standard marine exhaust systems, 9.5 to 10.75 compression ratio advised.  | <b>H-278-2</b>                                   | 2000-<br>5800         | <b>133801*</b><br><b>133802*<sup>a</sup></b>                              | <b>99277-16</b><br><b>99377-16<sup>d</sup></b> | 222  | 278   | 114                           | 2 40   | .000                | .529                          |
|   |  |                       |   |  | 234  | 290   | 56 (2)                        | .000   | .525                |                               |
| Fair idle, moderate performance usage, good mid range to upper RPM torque and HP, mild bracket racing, Street, Heavy, Pro ET, Street ET, etc., auto trans w/2500+ converter, 3000-3400 cruise RPM, oval track; Street Stock, Enduro, Hobby, etc., 1/4-3/8 mile, serious off road, 9.5 to 11.0 compression ratio advised.  | <b>Energizer<br/>282 H08</b>                     | 2200-<br>5600         | <b>10307*</b><br><b>103072*<sup>b</sup></b><br><b>133072*<sup>c</sup></b> | <b>99277-16</b><br><b>99377-16<sup>d</sup></b> | 226  | 282   | 108                           | 7 39   | .000                | .533                          |
|   |  |                       |   |  | 226  | 282   | 43 3                          | .000   | .533                |                               |
| Good mid range torque & HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, good w/plate or manifold nitrous system, marine applications; primarily used in 350+ HP mildly modified engines with free-flowing above water exhaust systems for performance applications, responds well to improved cylinder heads. 3200-3600 cruise RPM, 9.5 to 11.5 compression ratio advised. Good w/centrifugal or Roots supercharger, 10 lbs. max. boost w/8.5 max. compression ratio advised. | <b>H-286-2</b>                                   | 2400-<br>6200         | <b>134241*</b><br><b>134242*<sup>a</sup></b>                              | <b>99277-16</b><br><b>99377-16<sup>d</sup></b> | 226  | 286   | 112                           | 6 40   | .000                | .534                          |
|   |  |                       |   |  | 236  | 296   | 55 1                          | .000   | .553                |                               |
| Good mid range to upper RPM torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised.   | <b>Energizer<br/>284 H12</b>                     | 2800-<br>6200         | <b>10306*</b><br><b>103062*<sup>b</sup></b>                               | <b>99277-16</b><br><b>99377-16<sup>d</sup></b> | 228  | 284   | 112                           | 7 41   | .000                | .544                          |
|   |  |                       |   |  | 228  | 284   | 51 (3)                        | .000   | .544                |                               |
| Fair idle, standard camshaft for Mercruiser 400, 405, 420, 425 HP & 525SC-454 cu.in. engines, applicable to 350, 365, 370 HP mildly modified engines with free-flowing above water exhaust systems for performance applications, 9.5 to 11.5 compression ratio advised.   | <b>H-228/312-25-14 T1.2</b>                      | 2800-<br>6600         | <b>132561*</b>  | <b>99277-16</b><br><b>99377-16<sup>d</sup></b> | 228  | 298   | 114                           | 5 53   | .000                | .530                          |
|   |  |                       |   |  | 236  | 306   | 57 (1)                        | .000   | .551                |                               |
| Good mid range to upper RPM torque and HP, rough idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3600-4000 cruise RPM, 9.75 to 11.0 compression ratio advised.   | <b>H-230/318-2-10</b>                            | 3000-<br>6600         | <b>130211*</b>  | <b>99277-16</b><br><b>99377-16<sup>d</sup></b> | 230  | 290   | 110                           | 10 40  | .000                | .541                          |
|   |  |                       |   |  | 240  | 300   | 55 5                          | .000   | .559                |                               |
| Performance usage, good mid and upper RPM torque and HP, bracket racing; Heavy, Pro ET, Super ET, etc., auto trans w/3000+ converter, oval track; Street Stock, Enduro, Hobby, etc., 3/8-1/2 mile, 10.0 to 11.5 compression ratio advised.  | <b>Saturday Night Special<br/>H-236/325-2-10</b> | 3000-<br>6600         | <b>134551*</b><br><b>134552*<sup>c</sup></b>                              | <b>99277-16</b><br><b>99377-16<sup>d</sup></b> | 236  | 296   | 110                           | 13 43  | .000                | .553                          |
|   |  |                       |   |  | 246  | 306   | 58 8                          | .000   | .571                |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** 1991-95 Gen V engines can use these camshafts and components if lifter preload is checked, or if converted to use adjustable rocker arms by installing **99152-16** rocker arm studs (no machining required) and appropriate rocker arms.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

**NOTE:** Camshafts with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap), are available on special order. Contact Crane's Performance Consultants for details.

**IMPORTANT NOTE:** Some 1973 thru 1981 454 cu.in. engines were equipped with exhaust valve rotators. In these instances when using dual valve springs, use either our **99459-8** Spring Seat Spacers or 4 of **99948-2** valve spring retainers (on the exhaust valves only) to prevent excessive valve spring shimming when eliminating the rotators. Some later engines were equipped with rotators on both the intake and exhaust valves. For these applications when using dual valve springs, use either 2 of our **99459-8** Spring Seat Spacers or our **99948-16** valve spring retainers to prevent excessive valve spring shimming when eliminating the rotators.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>                           | <i>See pg. 337</i>                             | <i>See pg. 350</i>                | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>                             | <i>See pg. 328</i>   | <i>See pg. 312</i>                                | <i>See pg. 315</i>                                  | <i>See pg. 317</i>                                |
|--|--|-----------------------------------|-----------------------|----------------------|--|--|---|---|---|
| VALVE SPRING AND RETAINER KITS               | VALVE SPRINGS                                  | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS                                 | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
| 13308-1 <sup>e</sup><br>13309-1 <sup>f</sup> | 99839-16 <sup>e</sup><br>96801-16 <sup>f</sup> | 99948-16<br>99957-16 <sup>b</sup> |                       | 99098-1 <sup>k</sup> | 13634-16 <sup>l</sup><br>13640-16 <sup>m</sup> | 13975-1 <sup>n</sup><br>13984-1 <sup>o</sup><br>13977-1 <sup>p</sup> | 13800-16 <sup>qr</sup>                            | 13774-16 <sup>rs</sup><br>13744-16 <sup>tv</sup>    | 13750-16 <sup>w</sup><br>13763TR-16 <sup>xx</sup> |
| 13308-1 <sup>e</sup><br>13309-1 <sup>f</sup> | 99839-16 <sup>e</sup><br>96801-16 <sup>f</sup> | 99948-16<br>99957-16 <sup>b</sup> |                       | 99098-1 <sup>k</sup> | 13634-16 <sup>l</sup><br>13640-16 <sup>m</sup> | 13975-1 <sup>n</sup><br>13984-1 <sup>o</sup><br>13977-1 <sup>p</sup> | 13800-16 <sup>qr</sup>                            | 13774-16 <sup>rs</sup><br>13744-16 <sup>tv</sup>    | 13750-16 <sup>w</sup><br>13763TR-16 <sup>xx</sup> |
| 13308-1 <sup>e</sup><br>13309-1 <sup>f</sup> | 99839-16 <sup>e</sup><br>96801-16 <sup>f</sup> | 99948-16<br>99957-16 <sup>b</sup> |                       | 99098-1 <sup>k</sup> | 13634-16 <sup>l</sup><br>13640-16 <sup>m</sup> | 13975-1 <sup>n</sup><br>13984-1 <sup>o</sup><br>13977-1 <sup>p</sup> | 13800-16 <sup>qr</sup>                            | 13774-16 <sup>rs</sup><br>13744-16 <sup>tv</sup>    | 13750-16 <sup>w</sup><br>13763TR-16 <sup>xx</sup> |
| 13308-1 <sup>e</sup><br>13309-1 <sup>f</sup> | 99839-16 <sup>e</sup><br>96801-16 <sup>f</sup> | 99948-16<br>99957-16 <sup>b</sup> |                       | 99098-1 <sup>k</sup> | 13634-16 <sup>l</sup><br>13640-16 <sup>m</sup> | 13975-1 <sup>n</sup><br>13984-1 <sup>o</sup><br>13977-1 <sup>p</sup> | 13800-16 <sup>qr</sup>                            | 13774-16 <sup>rs</sup><br>13744-16 <sup>tv</sup>    | 13750-16 <sup>w</sup><br>13763TR-16 <sup>xx</sup> |
| 13308-1 <sup>e</sup><br>13309-1 <sup>f</sup> | 99839-16 <sup>e</sup><br>96801-16 <sup>f</sup> | 99948-16<br>99957-16 <sup>b</sup> |                       | 99098-1 <sup>k</sup> | 13634-16 <sup>l</sup><br>13640-16 <sup>m</sup> | 13975-1 <sup>n</sup><br>13984-1 <sup>o</sup><br>13977-1 <sup>p</sup> | 13800-16 <sup>qr</sup>                            | 13774-16 <sup>rs</sup><br>13744-16 <sup>tv</sup>    | 13750-16 <sup>w</sup><br>13763TR-16 <sup>xx</sup> |
|  | 99893-16<br>96896-16 <sup>g</sup>              | 99954-16<br>99955-16 <sup>i</sup> | 99822-16 <sup>j</sup> | 99098-1 <sup>k</sup> | 13634-16 <sup>l</sup><br>13640-16 <sup>m</sup> | 13975-1 <sup>n</sup><br>13984-1 <sup>o</sup><br>13977-1 <sup>p</sup> | 13801-16 <sup>rs</sup><br>13801C-16 <sup>st</sup> | 13774-16 <sup>rs</sup><br>13744-16 <sup>tv</sup>    | 13750-16 <sup>w</sup><br>13763TR-16 <sup>xx</sup> |
|  | 99893-16<br>96896-16 <sup>g</sup>              | 99954-16<br>99955-16 <sup>i</sup> | 99822-16 <sup>j</sup> | 99098-1 <sup>k</sup> | 13634-16 <sup>l</sup><br>13640-16 <sup>m</sup> | 13975-1 <sup>n</sup><br>13984-1 <sup>o</sup><br>13977-1 <sup>p</sup> | 13801-16 <sup>rs</sup><br>13801C-16 <sup>st</sup> | 13774-16 <sup>rs</sup><br>13744-16 <sup>tv</sup>    | 13750-16 <sup>w</sup><br>13763TR-16 <sup>xx</sup> |
|  | 99893-16<br>96896-16 <sup>g</sup>              | 99954-16<br>99955-16 <sup>i</sup> | 99822-16 <sup>j</sup> | 99098-1 <sup>k</sup> | 13634-16 <sup>l</sup><br>13640-16 <sup>m</sup> | 13975-1 <sup>n</sup><br>13984-1 <sup>o</sup><br>13977-1 <sup>p</sup> | 13801-16 <sup>rs</sup><br>13801C-16 <sup>st</sup> | 13774-16 <sup>rs</sup><br>13744-16 <sup>tv</sup>    | 13750-16 <sup>w</sup><br>13763TR-16 <sup>xx</sup> |

**Section Continued**

- a** Cam and Lifter Kit, includes installation lubricants and Cam Sprocket Bolt Locking Plate.
- b** Cam and Lifter Kit, includes assembly lubricant.
- c** Cam, lifter and valve spring kit, includes installation lubricants.
- d** Optional HI Intensity hydraulic lifters, see page 292 for details.
- e** Contains standard diameter valve springs, no machining required. NOTE: 1980 and later truck 366, 402, 427 and 454 engines have a short valve spring assembly height and should use **99837-16** standard diameter valve springs and **99957-16** retainers, contained in **13309-1** spring and retainer kit.
- f** For 1980-95 truck 366, 402, 427 and 454 engines with short valve spring assembly height, contains standard diameter valve springs.
- g** Optional harmonic frequency optimized valve springs for street, marine, and endurance applications. Requires **99955-16** retainers.
- h** For 1980-95 truck 366, 402, 427 and 454 engines with short valve spring assembly height.
- i** For **99896-16** valve springs.
- j** Must machine cylinder heads.
- k** Machined steel, heat treated.
- l** Heavy wall, heat treated.
- m** Pro Series one-piece, 3/8" diameter.
- n** Performance steel billet gears and roller chain set.
- o** Pro Series steel billet gears and roller chain set.
- p** Pro Series steel billet gears and roller chain set with thrust bearing.
- q** 1.7 ratio, 7/16" stud, long slot for 1.560" maximum O.D. valve springs.
- r** 1991-95 engines require the installation of **99152-16** 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
- s** 1.7 ratio, extra long slot for 1.560" maximum O.D. valve springs.
- t** 1.7 ratio, Nitro Carb, extra long slot for 1.560" maximum O.D. valve springs.
- u** Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- v** Energizer, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- w** 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- x** 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number      | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|---------------------------------------|-----------------------|--|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b><br>Fair idle, performance usage, good mid range HP, mild bracket racing, auto trans w/3000+ converter, marine performance for 500+ cu.in. modified engines w/ center riser type exhaust system & 4" outlets, requires large oval or rectangular port cylinder heads for performance applications, 3800-4200 cruise RPM, good w/ manifold nitrous system, 10.0 to 11.5 compression ratio advised. Good w/ Roots supercharger, 15 lbs. max. boost w/8.0 max. compression ratio advised. | <b>H-296-2</b>                        | 3000-6800             | <b>134561*</b>                             | <b>99277-16</b> | 236  | 296   | 114                           | 9 47   | .000                        | .553                          |
|   |                                       |                       |  |                 | <b>99377-16<sup>b</sup></b>                | 246   | 306                           | 62 4   | .000                        | .571                          |
| Rough idle, performance usage, good mid range HP, bracket racing, auto trans w/3000+ converter, 3800-4200 cruise RPM, 10.0 to 11.5 compression ratio advised. Good w/Roots supercharger, 15 lbs. max. boost w/8.0 max. compression ratio advised.   | <b>Energizer 294-304 H14</b>          | 3200-6800             | <b>10313*</b>                              | <b>99277-16</b> | 238  | 294   | 114                           | 10 48  | .000                        | .569                          |
|   |                                       |                       |  |                 | <b>99377-16<sup>b</sup></b>                | 248   | 304                           | 63 5   | .000                        | .595                          |
| Rough idle, performance usage, good mid to upper RPM torque and HP, bracket racing, auto trans w/3200+ converter, marine performance, 3800-4200 cruise RPM, 10.5 to 11.75 compression ratio advised.  | <b>H-240/329-25-12</b>                | 3000-6800             | <b>130221*</b>                             | <b>99277-16</b> | 240  | 300   | 112                           | 13 47  | .000                        | .559                          |
|   |                                       |                       |  |                 | <b>99377-16<sup>b</sup></b>                | 246   | 306                           | 60 6   | .000                        | .571                          |
| Rough idle, performance usage, good upper RPM torque and HP, Pro Street 500+ cu.in., bracket racing, auto trans w/3500+ converter, marine performance, 4000-4400 cruise RPM, good w/manifold nitrous system, 11.0 to 12.5 compression ratio advised. Good w/ Roots supercharger, 16 lbs. maximum boost w/8.0 maximum compression ratio advised.   | <b>H-242/322-2-14</b>                 | 3200-7000             | <b>130231*</b>                             | <b>99277-16</b> | 242  | 322   | 114                           | 12 50  | .000                        | .547                          |
|   |                                       |                       |  |                 | <b>99377-16<sup>b</sup></b>                | 252   | 332                           | 65 7   | .000                        | .566                          |
| Performance usage, good upper RPM torque and HP, bracket racing; Heavy, Pro ET, Super ET, etc., auto trans w/3500+ converter, also oval track; Street Stock, Enduro, Hobby, etc., 3/8-1/2 mile, 10.5 to 12.0 compression ratio advised.   | <b>Saturday Night Special 328 H08</b> | 3400-6800             | <b>133101*</b>                             | <b>99277-16</b> | 246  | 328   | 108                           | 17 49  | .000                        | .567                          |
|   |                                       |                       |  |                 | <b>133102<sup>a</sup></b>                  | <b>99377-16<sup>b</sup></b>                   | 246                           | 328  | 53 13                       | .000                          |
| Rough idle, performance usage, good upper RPM HP, bracket racing, auto trans w/3500+ converter, marine performance, 4000-4400 cruise RPM, good w/ manifold nitrous system, 10.5 to 12.0 compression ratio advised. Good w/Roots supercharger, 18 lbs. max. boost w/8.0 max. compression ratio advised.  | <b>H-306-2</b>                        | 3400-7000             | <b>134571*</b>                             | <b>99277-16</b> | 246  | 306   | 112                           | 16 50  | .000                        | .571                          |
|   |                                       |                       |  |                 | <b>99377-16<sup>b</sup></b>                | 254   | 314                           | 64 10  | .000                        | .585                          |
| Performance usage, good mid & upper RPM HP, for large displacement engines (500 cu.in.+), bracket racing, auto trans w/race converter, good w/large manifold nitrous system, radical marine performance, 10.75 to 12.5 compression ratio advised. Good w/large Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised.   | <b>H-248/3500-25-14</b>               | 3600-7000             | <b>130241*</b>                             | <b>99277-16</b> | 248  | 304   | 114                           | 15 53  | .000                        | .595                          |
|   |                                       |                       |  |                 | <b>99377-16<sup>b</sup></b>                | 256   | 312                           | 67 9   | .000                        | .595                          |
| Performance usage, good mid & upper RPM HP, for large displacement engines (500 cu.in.+), bracket racing, auto trans w/race converter, also w/large manifold nitrous system, marine performance, 10.5 to 12.0 compression ratio advised. Good w/large Roots supercharger, 22 lbs. maximum boost w/8.0 maximum compression ratio advised.  | <b>H-254/344-25-14</b>                | 3800-7200             | <b>130721*</b>                             | <b>99277-16</b> | 254  | 314   | 114                           | 18 56  | .000                        | .585                          |
|   |                                       |                       |  |                 | <b>99377-16<sup>b</sup></b>                | 262   | 322                           | 70 12  | .000                        | .600                          |
| Performance usage, good upper RPM HP, for large displacement engines (500 cu.in.+), bracket racing, auto trans w/race converter, also nitrous and radical marine performance, 11.5 min. compression ratio advised.  | <b>H-262/353-25-14</b>                | 4000-7200             | <b>130731*</b>                             | <b>99277-16</b> | 262  | 322   | 114                           | 22 60  | .000                        | .600                          |
|   |                                       |                       |  |                 | <b>99377-16<sup>b</sup></b>                | 270   | 330                           | 74 16  | .000                        | .615                          |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** 1991-95 Gen V engines can use these camshafts and components if lifter preload is checked, or if converted to use adjustable rocker arms by installing **99152-16** rocker arm studs (no machining required) and appropriate rocker arms.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** In order to use these cams in 65-66 engines, you must

groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

**NOTE:** Camshafts with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap), are available on special order. Contact Crane's Performance Consultants for details.

**IMPORTANT NOTE:** Some 1973 thru 1981 454 cu.in. engines were equipped with exhaust valve rotators. In these instances when using dual valve springs, use either our **99459-8** Spring Seat Spacers or 4 of **99948-2** valve spring retainers (on the exhaust valves only) to prevent excessive valve

spring shimming when eliminating the rotators. Some later engines were equipped with rotators on both the intake and exhaust valves. For these applications when using dual valve springs, use either 2 of our **99459-8** Spring Seat Spacers or our **99948-16** valve spring retainers to prevent excessive valve spring shimming when eliminating the rotators.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                       | See pg. 350                       | See pg. 362           | See pg. 360          | See pg. 306                                    | See pg. 328  | See pg. 312   | See pg. 315   | See pg. 317  |
|--------------------------------|-----------------------------------|-----------------------------------|-----------------------|----------------------|--|--|---|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                     | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS                                   | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 99893-16<br>96896-16 <sup>c</sup> | 99954-16<br>99955-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 13634-16 <sup>g</sup><br>13640-16 <sup>h</sup> | 13975-1 <sup>i</sup><br>13984-1 <sup>j</sup><br>13977-1 <sup>k</sup> | 13801-16 <sup>l,m</sup><br>13801C-16 <sup>m,n</sup> | 13774-16 <sup>m,o</sup><br>13744-16 <sup>m,p</sup>  | 13750-16 <sup>m,q</sup><br>13763TR-16 <sup>m,r</sup> |
|                                | 99893-16<br>96896-16 <sup>c</sup> | 99954-16<br>99955-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 13634-16 <sup>g</sup><br>13640-16 <sup>h</sup> | 13975-1 <sup>i</sup><br>13984-1 <sup>j</sup><br>13977-1 <sup>k</sup> | 13801-16 <sup>l,m</sup><br>13801C-16 <sup>m,n</sup> | 13774-16 <sup>m,o</sup><br>13744-16 <sup>m,p</sup>  | 13750-16 <sup>m,q</sup><br>13763TR-16 <sup>m,r</sup> |
|                                | 99893-16<br>96896-16 <sup>c</sup> | 99954-16<br>99955-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 13634-16 <sup>g</sup><br>13640-16 <sup>h</sup> | 13975-1 <sup>i</sup><br>13984-1 <sup>j</sup><br>13977-1 <sup>k</sup> | 13801-16 <sup>l,m</sup><br>13801C-16 <sup>m,n</sup> | 13774-16 <sup>m,o</sup><br>13744-16 <sup>m,p</sup>  | 13750-16 <sup>m,q</sup><br>13763TR-16 <sup>m,r</sup> |
|                                | 99893-16<br>96896-16 <sup>c</sup> | 99954-16<br>99955-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 13634-16 <sup>g</sup><br>13640-16 <sup>h</sup> | 13975-1 <sup>i</sup><br>13984-1 <sup>j</sup><br>13977-1 <sup>k</sup> | 13801-16 <sup>l,m</sup><br>13801C-16 <sup>m,n</sup> | 13774-16 <sup>m,o</sup><br>13744-16 <sup>m,p</sup>  | 13750-16 <sup>m,q</sup><br>13763TR-16 <sup>m,r</sup> |
|                                | 99893-16<br>96896-16 <sup>c</sup> | 99954-16<br>99955-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 13634-16 <sup>g</sup><br>13640-16 <sup>h</sup> | 13975-1 <sup>i</sup><br>13984-1 <sup>j</sup><br>13977-1 <sup>k</sup> | 13801-16 <sup>l,m</sup><br>13801C-16 <sup>m,n</sup> | 13774-16 <sup>m,o</sup><br>13744-16 <sup>m,p</sup>  | 13750-16 <sup>m,q</sup><br>13763TR-16 <sup>m,r</sup> |
|                                | 99893-16<br>96896-16 <sup>c</sup> | 99954-16<br>99955-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 13634-16 <sup>g</sup><br>13640-16 <sup>h</sup> | 13975-1 <sup>i</sup><br>13984-1 <sup>j</sup><br>13977-1 <sup>k</sup> | 13801-16 <sup>l,m</sup><br>13801C-16 <sup>m,n</sup> | 13774-16 <sup>m,o</sup><br>13744-16 <sup>m,p</sup>  | 13750-16 <sup>m,q</sup><br>13763TR-16 <sup>m,r</sup> |
|                                | 99893-16<br>96896-16 <sup>c</sup> | 99954-16<br>99955-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 13634-16 <sup>g</sup><br>13640-16 <sup>h</sup> | 13975-1 <sup>i</sup><br>13984-1 <sup>j</sup><br>13977-1 <sup>k</sup> | 13801-16 <sup>l,m</sup><br>13801C-16 <sup>m,n</sup> | 13774-16 <sup>m,o</sup><br>13744-16 <sup>m,p</sup>  | 13750-16 <sup>m,q</sup><br>13763TR-16 <sup>m,r</sup> |
|                                | 99893-16<br>96896-16 <sup>c</sup> | 99954-16<br>99955-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 13634-16 <sup>g</sup><br>13640-16 <sup>h</sup> | 13975-1 <sup>i</sup><br>13984-1 <sup>j</sup><br>13977-1 <sup>k</sup> | 13801-16 <sup>l,m</sup><br>13801C-16 <sup>m,n</sup> | 13774-16 <sup>m,o</sup><br>13744-16 <sup>m,p</sup>  | 13750-16 <sup>m,q</sup><br>13763TR-16 <sup>m,r</sup> |
|                                | 99893-16<br>96896-16 <sup>c</sup> | 99954-16<br>99955-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 13634-16 <sup>g</sup><br>13640-16 <sup>h</sup> | 13975-1 <sup>i</sup><br>13984-1 <sup>j</sup><br>13977-1 <sup>k</sup> | 13801-16 <sup>l,m</sup><br>13801C-16 <sup>m,n</sup> | 13774-16 <sup>m,o</sup><br>13744-16 <sup>m,p</sup>  | 13750-16 <sup>m,q</sup><br>13763TR-16 <sup>m,r</sup> |

- a Cam, lifter and valve spring kit, includes installation lubricants.
- b Optional HI Intensity hydraulic lifters, see page 292 for details.
- c Optional harmonic frequency optimized valve springs for street, marine, and endurance applications. Requires 99955-16 retainers.
- d For 99896-16 valve springs.
- e Must machine cylinder heads.
- f Machined steel, heat treated.
- g Heavy wall, heat treated.
- h Pro Series one-piece, 3/8" diameter.
- i Performance steel billet gears and roller chain set.
- j Pro Series steel billet gears and roller chain set.
- k Pro Series steel billet gears and roller chain set with thrust bearing.
- l 1.7 ratio, extra long slot for 1.560" maximum O.D. valve springs.
- m 1991-95 engines require the installation of 99152-16 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
- n 1.7 ratio, Nitro Carb, extra long slot for 1.560" maximum O.D. valve springs.
- o Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- p Energizer, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- q 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- r 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | See pg. 294<br>LIFTERS      | Degrees                         | Advertised                      | Degrees            | Open/Close                     | Lash                | Gross                |
|--|----------------------------------|-----------------------|--|-----------------------------|---------------------------------|---------------------------------|--------------------|--------------------------------|---------------------|----------------------|
|  |                                  |                       |  |                             | Duration<br>@ .050"<br>Int/Exh. | Degrees<br>Duration<br>Int/Exh. | Lobe<br>Separation | @ .050"<br>Cam Lift<br>Int/Exh | Hot<br>Int.<br>Exh. | Lift<br>Int.<br>Exh. |
| <b>Hydraulic Roller Camshafts — Retrofit</b>   |                                  |                       |  |                             |                                 |                                 |                    |                                |                     |                      |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1200-2000 cruise RPM, 8.0 to 9.25 compression ratio advised.   | <b>HR-204/286-2-12 IG</b>        | 800-4600              | <b>139601<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 204<br>214                      | 260<br>270                      | 112                | (5) 29<br>44 (10)              | .000<br>.000        | .486<br>.512         |
| Excellent low end torque & HP, good idle, daily usage, off road, towing, performance & fuel efficiency, 2600-3000 cruise RPM, marine applications: primarily used in 454 cu.in. near-stock engines for mild performance applications w/ free-flowing above water exhaust systems. 8.75 to 10.5 compression ratio advised.  | <b>ZHR-276-2S-10 IG</b>          | 1200-5000             | <b>139001<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 214<br>222                      | 276<br>284                      | 110                | 2 32<br>46 (4)                 | .000<br>.000        | .553<br>.576         |
| Good low end torque & HP, good idle, daily usage, w/ plate nitrous system, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised. Good w/centrifugal or Roots supercharger, 8 lbs. max. boost w/8.5 max. compression ratio advised.   | <b>HR-214/325-2S-12 IG</b>       | 1200-5200             | <b>139351<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 214<br>222                      | 276<br>284                      | 112                | 0 34<br>48 (6)                 | .000<br>.000        | .553<br>.576         |
| Good low end torque and HP, good idle, daily usage, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised. Crate motor upgrade. Good w/small centrifugal or Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised.   | <b>HR-218/3001-2S-14 IG</b>      | 1400-5200             | <b>139611<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 218<br>224                      | 278<br>284                      | 114                | (1) 39<br>50 (6)               | .000<br>.000        | .510<br>.510         |
| Good low end and mid range torque and HP, fair idle, daily usage, off road, 2600-3000 cruise RPM, 9.0 to 10.5 compression ratio advised.   | <b>HR-222/339-2S-10 IG</b>       | 1600-5400             | <b>139761<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 222<br>230                      | 284<br>292                      | 110                | 6 36<br>50 0                   | .000<br>.000        | .576<br>.598         |
| Excellent mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, good w/plate or manifold nitrous system, marine applications: for 454-502 cu.in. modified engines in performance applications with aftermarket high flow above water exhaust systems. 3000-3400 cruise RPM, 9.5 to 11.0 compression ratio advised. Good w/centrifugal or Roots supercharger, 10 lbs. maximum boost w/8.5 compression ratio advised. | <b>ZHR-288-2S-12 IG</b>          | 1800-5600             | <b>139011<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 226<br>234                      | 288<br>296                      | 112                | 6 40<br>54 0                   | .000<br>.000        | .587<br>.610         |
| Good mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, marine applications: for 502+ cu.in. modified engines in performance applications with aftermarket high flow above water exhaust systems. 3200-3600 cruise RPM, 9.75 to 11.25 compression ratio advised.   | <b>HR-230/352-2S1-14 IG</b>      | 2000-5800             | <b>139771<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 230<br>236                      | 292<br>298                      | 114                | 6 44<br>57 (1)                 | .000<br>.000        | .598<br>.610         |
| Good mid range torque & HP, fair idle, performance usage, mild bracket racing, good w/manifold nitrous system, auto trans w/3000+ converter, marine applications: for 454-502+ cu.in. modified engines in performance applications w/ aftermarket dry pipe exhaust systems. 3400-3800 cruise RPM, 10.0 to 11.5 compression ratio advised. Good w/Roots supercharger, 15 lbs. max. boost w/8.0 max. compression ratio advised.  | <b>ZHR-296-2S-12 IG</b>          | 2200-6000             | <b>139021<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 234<br>242                      | 296<br>304                      | 112                | 10 44<br>58 4                  | .000<br>.000        | .610<br>.632         |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

**NOTE:** The 1991-95 Gen V engines can use these camshafts and components if they are converted to adjustable rocker arms by installing **99152-16** rocker arm studs (no machining required) and appropriate rocker arms. Custom length pushrods can also be made to achieve correct lifter preload if

standard non-adjustable rocker arms are retained. See page 305 for special pushrod ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Camshafts with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap), are available on special order. Contact Crane's Performance Consultants for details.

**IMPORTANT NOTE:** Some 1973 thru 1981 454 cu.in. engines were equipped with exhaust valve rotators. In these instances when using dual valve springs, use either our **99459-8** Spring Seat Spacers or 4 of **99948-2** valve spring retainers (on the exhaust valves only) to prevent excessive valve spring shimming when eliminating the rotators. Some later

engines were equipped with rotators on both the intake and exhaust valves. For these applications when using dual valve springs, use either 2 of our **99459-8** Spring Seat Spacers or our **99948-16** valve spring retainers to prevent excessive valve spring shimming when eliminating the rotators.

**NOTE:** Left Hand rotation camshafts are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                       | See pg. 350                       | See pg. 362           | See pg. 360          | See pg. 306  | See pg. 328  | See pg. 312             | See pg. 315  | See pg. 317  |
|--------------------------------|-----------------------------------|-----------------------------------|-----------------------|----------------------|--|--|-------------------------|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                     | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS   | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS       | — ALUMINUM CRANE CLASSIC/ ENERGIZER                | ROCKERS — GOLD RACE                                |
|                                | 99896-16<br>99832-16 <sup>a</sup> | 99955-16<br>99976-16 <sup>f</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> | 13801-16 <sup>k,l</sup> | 13774-16 <sup>l,m</sup><br>13744-16 <sup>l,n</sup> | 13750-16 <sup>l,o</sup><br>13763TR-16 <sup>p</sup> |
|                                | 99896-16<br>99832-16 <sup>a</sup> | 99955-16<br>99976-16 <sup>f</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> | 13801-16 <sup>k,l</sup> | 13774-16 <sup>l,m</sup><br>13744-16 <sup>l,n</sup> | 13750-16 <sup>l,o</sup><br>13763TR-16 <sup>p</sup> |
|                                | 99896-16<br>99832-16 <sup>a</sup> | 99955-16<br>99976-16 <sup>f</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                         | 13774-16 <sup>l,m</sup><br>13744-16 <sup>l,n</sup> | 13750-16 <sup>l,o</sup><br>13763TR-16 <sup>p</sup> |
|                                | 99896-16<br>99832-16 <sup>a</sup> | 99955-16<br>99976-16 <sup>f</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                         | 13774-16 <sup>l,m</sup><br>13744-16 <sup>l,n</sup> | 13750-16 <sup>l,o</sup><br>13763TR-16 <sup>p</sup> |
|                                | 99896-16<br>99832-16 <sup>a</sup> | 99955-16<br>99976-16 <sup>f</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                         | 13774-16 <sup>l,m</sup><br>13744-16 <sup>l,n</sup> | 13750-16 <sup>l,o</sup><br>13763TR-16 <sup>p</sup> |
|                                | 99896-16<br>99832-16 <sup>a</sup> | 99955-16<br>99976-16 <sup>f</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                         | 13774-16 <sup>l,m</sup><br>13744-16 <sup>l,n</sup> | 13750-16 <sup>l,o</sup><br>13763TR-16 <sup>p</sup> |
|                                | 99896-16<br>99832-16 <sup>a</sup> | 99955-16<br>99976-16 <sup>f</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                         | 13774-16 <sup>l,m</sup><br>13744-16 <sup>l,n</sup> | 13750-16 <sup>l,o</sup><br>13763TR-16 <sup>p</sup> |
|                                | 99896-16<br>99832-16 <sup>a</sup> | 99955-16<br>99976-16 <sup>f</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                         | 13774-16 <sup>l,m</sup><br>13744-16 <sup>l,n</sup> | 13750-16 <sup>l,o</sup><br>13763TR-16 <sup>p</sup> |

Section Continued

- a Requires cam button spacer, camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b Vertical locking bar hydraulic roller lifters, no machining required.
- c Must machine cylinder heads.
- d Machined steel, heat treated.
- e Heavy wall, heat treated, for standard deck height blocks.
- f Pro Series, one piece.
- g Heavy wall, heat treated, for +.400" deck height "Tall Blocks".
- h Performance steel billet gears and roller chain set.
- i Pro Series steel billet gears and roller chain set.
- j Pro Series steel billet gears and roller chain set with thrust bearing.
- k 1.7 ratio, extra long slot for 1.560" maximum O.D. valve springs.
- l 1991-95 engines require the installation of **99152-16** 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
- m Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- n Energiizer, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- o 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- p 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.
- q Ovate wire beehive spring, requires **99976-16** retainers.
- r Steel, for **99832-16** beehive springs.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                     | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|---|----------------------------------|-----------------------|--|-----------------------------|--|---|-------------------------------|--|---------------------|-----------------------|
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |                                  |                       |  |                             |  |   |                               |  |                     |                       |
| Good mid range torque and HP, fair idle, performance usage, bracket racing, good with manifold nitrous system, auto trans w/3000+ converter, 3400-3800 cruise RPM, best in 502+ cu.in. engines. 10.0 to 11.5 compression ratio advised. Good w/supercharger, 16 lbs. max. boost w/8.0 max. compression ratio advised.   | <b>HR-236/359-2S-14 IG</b>       | 2200-6000             | <b>139671<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 236<br>244                                 | 298<br>306                                    | 114                           | 9 47<br>61 3                                 | .000<br>.000        | .610<br>.632          |
| Excellent mid range to upper RPM torque & HP, rough idle, performance usage, bracket racing, auto trans w/3000+ converter, 3600-4000 cruise RPM, marine usage: for 500+ modified engines w/dry aftermarket exhaust. 10.5 to 12.0 compression ratio advised.   | <b>HR-240/365-2S-12 IG</b>       | 2600-6200             | <b>139681<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 240<br>248                                 | 302<br>310                                    | 112                           | 13 47<br>61 7                                | .000<br>.000        | .621<br>.632          |
| Good mid range to upper RPM torque, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, marine performance for 480+ cu.in. modified engines in performance applications with aftermarket dry pipe exhaust systems, or tube headers, 3600-4000 cruise RPM, for 500+ cu.in. engines. 10.5 to 12.0 compression ratio advised.   | <b>HR-244/372-2S-10 IG</b>       | 2800-6200             | <b>139781<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 244<br>256                                 | 306<br>318                                    | 110                           | 17 47<br>63 13                               | .000<br>.000        | .632<br>.632          |
| Good mid range to upper RPM torque & HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, marine performance for 500+ cu.in. modified engines in performance applications w/aftermarket dry pipe exhaust systems, or tube headers, good w/manifold nitrous system, 3800-4200 cruise RPM, for 500+ cu.in. engines. 10.5 to 12.5 compression ratio advised. Good w/Roots supercharger, 18 lbs. max. boost w/8.0 max. compression ratio advised. | <b>HR-306-2S-14 IG</b>           | 3000-6400             | <b>139651<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 244<br>256                                 | 306<br>318                                    | 114                           | 13 51<br>67 9                                | .000<br>.000        | .632<br>.632          |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, Pro Street, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, for 500+ cu.in. engines. 11.0 to 12.5 compression ratio advised. Good w/Roots supercharger, 18 lbs. max. boost w/8.0 max. compression ratio advised.  | <b>HR-246/400-2S-14 IG</b>       | 3200-6400             | <b>139791<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 246<br>254                                 | 316<br>324                                    | 114                           | 13.5 52.5<br>65.5 8.5                        | .000<br>.000        | .680<br>.680          |
| Good mid range to upper RPM torque, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 3600-4000 cruise RPM, for 500+ cu.in. engines. 11.0 to 12.5 compression ratio advised.   | <b>HR-248/372-2S-10 IG</b>       | 3000-6400             | <b>139801<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 248<br>256                                 | 310<br>318                                    | 110                           | 19 49<br>63 13                               | .000<br>.000        | .632<br>.632          |
| Excellent upper RPM torque and HP, performance usage, bracket racing, good w/manifold nitrous system, auto trans w/3500+ converter, best in 540+ cu.in. engines. 11.0 to 12.5 compression ratio advised. Good w/supercharger, 20 lbs. maximum boost, w/8.0 maximum compression ratio advised.   | <b>HR-248/372-2S-14 IG</b>       | 3200-6400             | <b>139691<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 248<br>256                                 | 310<br>318                                    | 114                           | 15 53<br>67 9                                | .000<br>.000        | .632<br>.632          |
| Performance usage, bracket racing, good w/manifold nitrous system, auto trans w/race converter, best in 540+ cu.in. engines. 11.5 to 13.0 compression ratio advised. Good w/supercharger, 20 lbs. maximum boost, w/8.0 maximum compression ratio advised.   | <b>HR-250/400-2S1-14 IG</b>      | 3200-6400             | <b>139811<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 250<br>258                                 | 320<br>328                                    | 114                           | 15.5 54.5<br>68 10                           | .000<br>.000        | .680<br>.680          |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

**NOTE:** The 1991-95 Gen V engines can use these camshafts and components if they are converted to adjustable rocker arms by installing **99152-16** rocker arm studs (no machining required) and appropriate rocker arms. Custom length pushrods can also be made to achieve correct lifter preload if

standard non-adjustable rocker arms are retained. See page 305 for special pushrod ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Camshafts with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap), are available on special order. Contact Crane's Performance Consultants for details.

**IMPORTANT NOTE:** Some 1973 thru 1981 454 cu.in. engines were equipped with exhaust valve rotators. In these instances when using dual valve springs, use either our **99459-8** Spring Seat Spacers or 4 of **99948-2** valve spring retainers (on the exhaust valves only) to prevent excessive valve spring shimming when eliminating the rotators. Some later

engines were equipped with rotators on both the intake and exhaust valves. For these applications when using dual valve springs, use either 2 of our **99459-8** Spring Seat Spacers or our **99948-16** valve spring retainers to prevent excessive valve spring shimming when eliminating the rotators.

**NOTE:** Left Hand rotation camshafts are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                       | See pg. 350                       | See pg. 362           | See pg. 360          | See pg. 306  | See pg. 328  | See pg. 312       | See pg. 315   | See pg. 317  |
|--------------------------------|-----------------------------------|-----------------------------------|-----------------------|----------------------|--|--|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                     | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS   | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 99896-16<br>99832-16 <sup>p</sup> | 99955-16<br>99976-16 <sup>q</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup><br>13744-16 <sup>k,m</sup>  | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16<br>99832-16 <sup>p</sup> | 99955-16<br>99976-16 <sup>q</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup><br>13744-16 <sup>k,m</sup>  | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16<br>99832-16 <sup>p</sup> | 99955-16<br>99976-16 <sup>q</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup><br>13744-16 <sup>k,m</sup>  | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16<br>99832-16 <sup>p</sup> | 99955-16<br>99976-16 <sup>q</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup><br>13744-16 <sup>k,m</sup>  | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16<br>99832-16 <sup>p</sup> | 99955-16<br>99976-16 <sup>q</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup><br>13744-16 <sup>k,m</sup>  | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16<br>99832-16 <sup>p</sup> | 99955-16<br>99976-16 <sup>q</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup><br>13744-16 <sup>k,m</sup>  | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16<br>99832-16 <sup>p</sup> | 99955-16<br>99976-16 <sup>q</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup><br>13744-16 <sup>k,m</sup>  | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16<br>99832-16 <sup>p</sup> | 99955-16<br>99976-16 <sup>q</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup><br>13744-16 <sup>k,m</sup>  | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |

**Section Continued**

- a Requires cam button spacer, camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b Vertical locking bar hydraulic roller lifters, no machining required.
- c Must machine cylinder heads.
- d Machined steel, heat treated.
- e Heavy wall, heat treated, for standard deck height blocks.
- f Pro Series, one piece.
- g Heavy wall, heat treated, for +.400" deck height "Tall Blocks".
- h Performance steel billet gears and roller chain set.
- i Pro Series steel billet gears and roller chain set.
- j Pro Series steel billet gears and roller chain set with thrust bearing.
- k 1991-95 engines require the installation of **99152-16** 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
- l Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- m Energizer, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- n 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- o 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.
- p Ovate wire beehive spring, requires **99976-16** retainers.
- q Steel, for **99832-16** beehive springs.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                     | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------------------|--|---|-------------------------------|--|---------------------|-------------------------------|
| Performance usage, good upper RPM torque & HP, bracket racing, good w/large manifold nitrous system, auto trans w/3500+ converter, best in 540+ cu.in. engines w/prepared cylinder heads. 12.0 min. compression ratio advised. Good w/large supercharger, 22 lbs. max. boost w/8.5 max. compression ratio advised.   | <b>HR-254/400-2S-14 IG</b>       | 3400-6600             | <b>139701<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 254  | 324   | 114                           | 17.5 56.5                                    | .000                | .680                          |
|  |                                  |                       |  |                             | 262  | 332   |                               | 69.5 12.5                                    | .000                | .680                          |
| Good upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, best in 540+ cu.in. engines w/prepared cylinder heads. 12.0 minimum compression ratio advised.   | <b>HR-256/372-2S-10 IG</b>       | 3400-6600             | <b>139821<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 256  | 318   | 110                           | 23 53  | .000                | .632                          |
|  |                                  |                       |  |                             | 264  | 326   |                               | 67 17  | .000                | .632                          |
| Performance usage, good upper RPM HP, bracket racing, good w/large manifold nitrous system, auto trans w/3500+ converter, marine performance, 4000-4400 cruise RPM, for 540+ cu.in. engines. 11.0 minimum compression ratio advised. Good w/large Roots supercharger, good upper RPM HP, 480+ cu.in., 22 lbs. max. boost w/8.0 max. compression ratio advised. | <b>HR-318-2S-14 IG</b>           | 3600-6600             | <b>139661<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 256  | 318   | 114                           | 19 57  | .000                | .632                          |
|  |                                  |                       |  |                             | 264  | 326   |                               | 71 13  | .000                | .632                          |
| Competition only, bracket racing, good w/large manifold nitrous system, auto trans w/race converter, 4000-4400 cruise RPM, for 540+ cu.in. engines. 12.0 min. compression ratio advised. Good w/large Roots supercharger, good upper RPM HP, 480+ cu.in., 22 lbs. max. boost w/8.0 max. compression ratio advised.   | <b>HR-258/4001-2S-14 IG</b>      | 3600-6600             | <b>139831<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 258  | 328   | 114                           | 19.5 58.5                                    | .000                | .680                          |
|  |                                  |                       |  |                             | 266  | 336   |                               | 71.5 14.5                                    | .000                | .680                          |
| Competition only, bracket, Super Gas, Super Comp racing, auto trans w/race converter, best in 540+ cu.in. engines w/prepared cylinder heads, 12.5 minimum compression ratio advised.   | <b>HR-262/400-2S2-14 IG</b>      | 3800-6600             | <b>139841<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 262  | 332   | 114                           | 21.5 60.5                                    | .000                | .680                          |
|  |                                  |                       |  |                             | 266  | 336   |                               | 71.5 14.5                                    | .000                | .680                          |
| Competition only, bracket, Super Gas, Super Comp racing, auto trans w/race converter, best in 572+ cu.in. engines w/prepared cylinder heads, good w/large manifold nitrous system, 12.5 minimum compression ratio advised. Good w/large supercharger, 26 lbs. max. boost w/8.5 max. compression ratio advised.   | <b>HR-262/400-2S1-14 IG</b>      | 3800-6600             | <b>139711<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 262  | 332   | 114                           | 21.5 60.5                                    | .000                | .680                          |
|  |                                  |                       |  |                             | 270  | 340   |                               | 73.5 16.5                                    | .000                | .680                          |
| Competition only, best in 572+ cu.in. high torque applications: drag, marine, radical Pro Street, 13.0 minimum compression ratio advised.  | <b>HR-264/420-2S-15 IG</b>       | 4000-6800             | <b>139861<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 264  | 328   | 115                           | 21 63  | .000                | .714                          |
|  |                                  |                       |  |                             | 272  | 336   |                               | 75 17  | .000                | .714                          |
| Competition only, best in 572+ cu.in., high torque and RPM applications: drag, radical Pro Street, good w/large manifold nitrous system, 13.0 minimum compression ratio advised. Good w/large supercharger, 28 lbs. maximum boost w/9.0 maximum compression ratio advised.   | <b>HR-270/400-2S-14 IG</b>       | 4400-6800             | <b>139851<sup>a</sup></b>                  | <b>13532-16<sup>b</sup></b> | 270  | 340   | 114                           | 25.5 64.5                                    | .000                | .680                          |
|  |                                  |                       |  |                             | 282  | 347   |                               | 79 23  | .000                | .680                          |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

**NOTE:** The 1991-95 Gen V engines can use these camshafts and components if they are converted to adjustable rocker arms by installing **99152-16** rocker arm studs (no machining required) and appropriate rocker arms. Custom length pushrods can also be made to achieve correct lifter preload if

standard non-adjustable rocker arms are retained. See page 305 for special pushrod ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Camshafts with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap), are available on special order. Contact Crane's Performance Consultants for details.

**IMPORTANT NOTE:** Some 1973 thru 1981 454 cu.in. engines were equipped with exhaust valve rotators. In these instances when using dual valve springs, use either our **99459-8** Spring Seat Spacers or 4 of **99948-2** valve spring retainers (on the exhaust valves only) to prevent excessive valve spring shimming when eliminating the rotators. Some later

engines were equipped with rotators on both the intake and exhaust valves. For these applications when using dual valve springs, use either 2 of our **99459-8** Spring Seat Spacers or our **99948-16** valve spring retainers to prevent excessive valve spring shimming when eliminating the rotators.

**NOTE:** Left Hand rotation camshafts are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                       | See pg. 350                       | See pg. 362           | See pg. 360          | See pg. 306  | See pg. 328  | See pg. 312       | See pg. 315  | See pg. 317  |
|--------------------------------|-----------------------------------|-----------------------------------|-----------------------|----------------------|--|--|-------------------|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                     | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS   | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ ENERGIZER                | ROCKERS — GOLD RACE                                  |
|                                | 99896-16                          | 99955-16                          | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup>                            | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16<br>99832-16 <sup>p</sup> | 99955-16<br>99976-16 <sup>q</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup><br>13744-16 <sup>k,m</sup> | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16<br>99832-16 <sup>p</sup> | 99955-16<br>99976-16 <sup>q</sup> | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup><br>13744-16 <sup>k,m</sup> | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16                          | 99955-16                          | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup>                            | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16                          | 99955-16                          | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup>                            | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16                          | 99955-16                          | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup>                            | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16                          | 99955-16                          | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup>                            | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |
|                                | 99896-16                          | 99955-16                          | 99822-16 <sup>c</sup> | 99098-1 <sup>d</sup> | 13628-16 <sup>e</sup><br>13642-16 <sup>e,f</sup><br>13629-16 <sup>g</sup><br>13643-16 <sup>g</sup> | 13975-1 <sup>h</sup><br>13984-1 <sup>i</sup><br>13977-1 <sup>j</sup> |                   | 13774-16 <sup>k,l</sup>                            | 13750-16 <sup>k,n</sup><br>13763TR-16 <sup>k,o</sup> |

- a** Requires cam button spacer, camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b** Vertical locking bar hydraulic roller lifters, no machining required.
- c** Must machine cylinder heads.
- d** Machined steel, heat treated.
- e** Heavy wall, heat treated, for standard deck height blocks.
- f** Pro Series, one piece.
- g** Heavy wall, heat treated, for +.400" deck height "Tall Blocks".
- h** Performance steel billet gears and roller chain set.
- i** Pro Series steel billet gears and roller chain set.
- j** Pro Series steel billet gears and roller chain set with thrust bearing.
- k** 1991-95 engines require the installation of **99152-16** 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
- l** Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- m** EnergiZER, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- n** 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- o** 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.
- p** Ovate wire beehive spring, requires **99976-16** retainers.
- q** Steel, for **99832-16** beehive springs.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number          | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code       | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|---|---|-----------------------|--|-----------------|--|---|-------------------------------|--|---------------------|-----------------------|
| <b>Mechanical Lifter Camshafts</b>  |   |                       |  |                 |  |   |                               |  |                     |                       |
| Excellent low end and mid range torque and HP, fair idle, moderate performance usage, bracket racing w/ heavy car, off road, auto trans w/2000+ converter, 3200-3600 cruise RPM, 10.5 to 11.5 compression ratio advised.  | <b>F-238/3200-2-8</b>                     | 2600-6200             | <b>131101<sup>a</sup></b>                        | <b>99250-16</b> | 238<br>248                                 | 300<br>310                                    | 108                           | 16 42<br>57 11                               | .022<br>.022        | .544<br>.567          |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, bracket racing, auto trans w/2000+ converter, also w/plate or manifold nitrous system, 3400-3800 cruise RPM, 10.5 to 11.5 compression ratio advised. Good w/centrifugal or Roots supercharger, 10 lbs. maximum boost w/8.5 maximum compression ratio advised.  | <b>F-304-2</b>                            | 2800-6600             | <b>133841</b>                                    | <b>99250-16</b> | 238<br>248                                 | 304<br>314                                    | 114                           | 10 48<br>63 5                                | .022<br>.022        | .544<br>.567          |
| Replacement for factory 375 HP 396 cu.in., 425 HP 427 cu.in., 435 HP 427 cu.in., 460 HP 454 cu.in. camshaft.  | <b>BluePrinted<br/>3863143</b>            | 3000-6400             | <b>969961</b>                                    | <b>99250-16</b> | 242<br>242                                 |   | 114                           | 13 49<br>61 1                                | .024<br>.028        | .520<br>.520          |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, bracket racing, auto trans w/2000+ converter, 3600-4000 cruise RPM, 10.5 to 11.5 compression ratio advised.  | <b>F-244/3454-2S-8</b>                    | 3200-6600             | <b>131111<sup>*</sup></b>                        | <b>99250-16</b> | 244<br>252                                 | 280<br>288                                    | 108                           | 18 46<br>58 14                               | .026<br>.026        | .587<br>.608          |
| Good mid range torque and HP, fair idle, moderate performance usage, bracket racing, auto trans w/2500+ converter, good w/plate or manifold nitrous system, 3600-4000 cruise RPM, 10.75 to 12.0 compression ratio advised. Good w/centrifugal or Roots supercharger, 14 lbs. maximum boost w/8.5 maximum compression ratio advised.   | <b>F-244/3454-2S-14</b>                   | 3400-6800             | <b>131121<sup>*</sup></b>                        | <b>99250-16</b> | 244<br>252                                 | 280<br>288                                    | 114                           | 12 52<br>64 8                                | .026<br>.026        | .587<br>.608          |
| Good mid range torque & HP, rough idle, moderate performance usage, auto trans w/2500+ converter, 3800-4200 cruise RPM, bracket racing: Pro E.T., Super E.T., Super Pro, Hot Rod, auto trans w/race converter; oval track; Street Stock, Modified, etc., 1/4-3/8 mile, & marine performance usage in 454-502 cu.in. modified engines w/aftermarket high flow above water exhaust systems. 11.0 to 12.0 compression ratio advised. | <b>Saturday Night Special<br/>F-314-2</b> | 3400-7000             | <b>134781<sup>*</sup><br/>134782<sup>a</sup></b> | <b>99250-16</b> | 248<br>258                                 | 314<br>324                                    | 110                           | 19 49<br>64 14                               | .022<br>.022        | .567<br>.590          |
| Good mid range torque and HP, performance usage, fair idle, bracket racing, auto trans w/3000+ converter, 4000-4400 cruise RPM, 11.25 to 12.25 compression ratio advised.   | <b>F-252/3574-2S-8</b>                    | 3600-7000             | <b>131131<sup>*</sup></b>                        | <b>99250-16</b> | 252<br>260                                 | 288<br>296                                    | 108                           | 21 51<br>61 19                               | .026<br>.026        | .608<br>.628          |
| Good mid range torque and HP, performance usage, fair idle, bracket racing, auto trans w/3000+ converter, 4000-4400 cruise RPM, good w/manifold nitrous system, 11.5 to 12.5 compression ratio advised. Good w/Roots supercharger, 18 lbs. max. boost w/8.0 max. compression ratio advised.   | <b>F-252/3574-2S-14</b>                   | 3600-7200             | <b>131271<sup>*</sup></b>                        | <b>99250-16</b> | 252<br>260                                 | 288<br>296                                    | 114                           | 16 56<br>68 12                               | .026<br>.026        | .608<br>.628          |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**  
**IMPORTANT NOTE:** 1991-95 Gen V engines can use these camshafts and components if they are converted to adjustable rocker arms by machining the cylinder heads for **99157-16** 7/16" screw-in studs and **13650-1** pushrod guideplates, and installing appropriate rocker arms.  
**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.  
**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

**NOTE:** Camshafts with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap), are available on special order. Contact Crane's Performance Consultants for details.  
**IMPORTANT NOTE:** Some 1973 thru 1981 454 cu.in. engines were equipped with exhaust valve rotators. In these instances when using dual valve springs, use either our **99459-8** Spring Seat Spacers or 4 of **99948-2** valve spring retainers (on the exhaust valves only) to prevent excessive valve spring shimming when eliminating the rotators. Some later engines were equipped with rotators on both the intake and exhaust valves. For these applications when using dual valve springs, use either 2 of our **99459-8** Spring Seat Spacers or

our **99948-16** valve spring retainers to prevent excessive valve spring shimming when eliminating the rotators. Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>    | <i>See pg. 350</i> | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>                             | <i>See pg. 328</i>   | <i>See pg. 312</i>                                | <i>See pg. 315</i>                                  | <i>See pg. 317</i>                                 |
|--------------------------------|-----------------------|--------------------|-----------------------|----------------------|--|--|---|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS          | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS                                 | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 99893-16              | 99954-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> | 13801-16 <sup>ij</sup><br>13801C-16 <sup>jk</sup> | 13774-16 <sup>jl</sup>                              | 13750-16 <sup>jm</sup><br>13763TR-16 <sup>ln</sup> |
|                                | 99893-16              | 99954-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> | 13801-16 <sup>ij</sup><br>13801C-16 <sup>jk</sup> | 13774-16 <sup>jl</sup>                              | 13750-16 <sup>jm</sup><br>13763TR-16 <sup>ln</sup> |
|                                | 99893-16              | 99954-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> | 13801-16 <sup>ij</sup><br>13801C-16 <sup>jk</sup> | 13774-16 <sup>jl</sup>                              | 13750-16 <sup>jm</sup><br>13763TR-16 <sup>ln</sup> |
|                                | 99893-16              | 99954-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> | 13801-16 <sup>ij</sup><br>13801C-16 <sup>jk</sup> | 13774-16 <sup>jl</sup>                              | 13750-16 <sup>jm</sup><br>13763TR-16 <sup>ln</sup> |
|                                | 99890-16              | 99974-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> |   | 13774-16 <sup>jl</sup>                              | 13750-16 <sup>jm</sup><br>13763TR-16 <sup>ln</sup> |
|                                | 99890-16 <sup>a</sup> | 99974-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> |   | 13774-16 <sup>jl</sup>                              | 13750-16 <sup>jm</sup><br>13763TR-16 <sup>ln</sup> |
|                                | 99890-16 <sup>a</sup> | 99974-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> |   | 13774-16 <sup>jl</sup>                              | 13750-16 <sup>jm</sup><br>13763TR-16 <sup>ln</sup> |

**Section Continued**

- a Cam, lifter, valve spring and retainer kit, includes installation lubricants.
- b Must machine cylinder heads.
- c Machined steel, heat treated.
- d Heavy wall, heat treated.
- e Pro Series, one piece.
- f Performance steel billet gears and roller chain set.
- g Pro Series steel billet gears and roller chain set.
- h Pro Series steel billet gears and roller chain set with thrust bearing.

- i 1.7 ratio, extra long slot for 1.560" maximum O.D. valve springs.
- j 1991-95 engines require the installation of **99157-16** 7/16" rocker arm studs and **13650-1** pushrod guideplates (machining required).
- k 1.7 ratio, Nitro Carb, extra long slot for 1.560" maximum O.D. valve springs.
- l Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- m 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- n 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number          | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code   | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|--|---|-----------------------|--|-----------------|--|---|-------------------------------|--|---------------------|-----------------------|
| Good mid range and upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3000+ converter, 4000-4400 cruise RPM 11.5 to 12.5 compression ratio advised.  | <b>F-326-2</b>                            | 3800-7400             | <b>134261*</b>                               | <b>99250-16</b> | 252  | 326   | 110                           | 21 51  | .022                | .554                  |
|  |   |                       |  |                 | 262  | 336   | 66 16                         | .024   | .554                |                       |
| Good mid range and upper RPM torque and HP, performance usage, bracket racing, auto trans w/race converter, marine performance usage in 500+ cu.in. modified engines with aftermarket dry pipe exhaust system or tube headers, also replacement cam for Mercruiser 575 HP 540 cu.in. engines. 11.5 to 12.5 compression ratio advised.          | <b>F-256/3634-2S-8</b>                    | 4000-7400             | <b>131311*</b>                               | <b>99250-16</b> | 256  | 292   | 108                           | 23 53  | .026                | .618                  |
|  |   |                       |  |                 | 264  | 300   | 63 21                         | .026   | .638                |                       |
| Good mid range and upper RPM torque and HP, performance usage, auto trans w/3000+ converter, 4200-4600 cruise RPM, bracket racing; Pro, Pro E.T., Super E.T., Super Pro, Hot Rod, auto trans w/race converter; oval track; Street Stock, Modified, etc., 3/8-1/2 mile, 11.5 to 12.5 compression ratio advised.                                 | <b>Saturday Night Special<br/>F-290-2</b> | 4000-7500             | <b>134691*</b><br><b>134692*<sup>a</sup></b> | <b>99250-16</b> | 256  | 290   | 110                           | 23 53  | .026                | .580                  |
|  |   |                       |  |                 | 266  | 300   | 68 18                         | .026   | .600                |                       |
| Strong mid range torque and HP, performance usage, bracket racing, auto trans w/race converter, oval track; Street Stock, Modified, etc., 3/8-1/2 mile, marine, radical performance usage in 540+ cu.in. modified engines with ported cylinder heads and tube headers, 12.0 minimum compression ratio advised.                                 | <b>F-260/3694-2S-8</b>                    | 4200-7600             | <b>131441*</b>                               | <b>99250-16</b> | 260  | 296   | 108                           | 25 55  | .026                | .628                  |
|  |   |                       |  |                 | 268  | 304   | 65 23                         | .026   | .648                |                       |
| Rough idle, performance usage, good upper RPM HP, 480+ cu.in., Pro Street, bracket racing, auto trans w/3500+ converter, 4400-4800 cruise RPM, also good w/manifold nitrous system, good upper RPM HP, 12.0 minimum compression ratio advised. Good w/large Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised. | <b>F-260/3694-2S-14</b>                   | 4200-7800             | <b>131281*</b>                               | <b>99250-16</b> | 260  | 296   | 114                           | 19 61  | .026                | .628                  |
|  |   |                       |  |                 | 268  | 304   | 71 17                         | .026   | .648                |                       |
| Replacement for factory 430 HP 427 cu.in. (2nd design L88), ZL1 427 cu.in., L57 454 cu.in. camshaft.   | <b>BluePrinted<br/>3959180</b>            | 4400-7200             | <b>131141*</b>                               | <b>99250-16</b> | 262  |   | 110                           | 24 58  | .022                | .575                  |
|  |   |                       |  |                 | 272  |   | 69 23                         | .024   | .615                |                       |
| Replacement for 400 HP 427 cu.in. (1st design L88) camshaft.   | <b>BluePrinted<br/>3925535</b>            | 4400-7200             | <b>968561</b>                                | <b>99250-16</b> | 264  |   | 112                           | 24 60  | .024                | .560                  |
|  |   |                       |  |                 | 269  |   | 70.5 18.5                     | .026   | .580                |                       |
| Moderate competition only, good upper RPM torque and HP, bracket racing; Super Pro, Hot Rod, auto trans w/race converter, oval track; Street Stock, Modified, etc., 3/8-1/2 mile. 12.0 minimum compression ratio advised.  | <b>Saturday Night Special<br/>F-310-2</b> | 4400-7800             | <b>134761*</b><br><b>134762*<sup>a</sup></b> | <b>99250-16</b> | 266  | 310   | 110                           | 28 58  | .026                | .600                  |
|  |   |                       |  |                 | 276  | 320   | 73 23                         | .026   | .620                |                       |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** 1991-95 Gen V engines can use these camshafts and components if they are converted to adjustable rocker arms by machining the cylinder heads for **99157-16** 7/16" screw-in studs and **13650-1** pushrod guideplates, and installing appropriate rocker arms.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

**NOTE:** Camshafts with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap), are available on special order. Contact Crane's Performance Consultants for details.

**IMPORTANT NOTE:** Some 1973 thru 1981 454 cu.in. engines were equipped with exhaust valve rotators. In these instances when using dual valve springs, use either our **99459-8** Spring Seat Spacers or 4 of **99948-2** valve spring retainers (on the exhaust valves only) to prevent excessive valve spring shimming when eliminating the rotators. Some later engines were equipped with rotators on both the intake and exhaust valves. For these applications when using dual valve springs, use either 2 of our **99459-8** Spring Seat Spacers or

our **99948-16** valve spring retainers to prevent excessive valve spring shimming when eliminating the rotators.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i> | <i>See pg. 350</i> | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>                             | <i>See pg. 328</i>   | <i>See pg. 312</i>                                | <i>See pg. 315</i>                                  | <i>See pg. 317</i>                                 |
|--------------------------------|--------------------|--------------------|-----------------------|----------------------|--|--|---|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS      | RETAINERS          | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS                                 | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 99890-16           | 99974-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> |   | 13774-16 <sup>j,l</sup>                             | 13750-16 <sup>j,m</sup><br>13763TR-16 <sup>n</sup> |
|                                | 99890-16           | 99974-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> |   | 13774-16 <sup>j,l</sup>                             | 13750-16 <sup>j,m</sup><br>13763TR-16 <sup>n</sup> |
|                                | 99890-16           | 99974-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> |   | 13774-16 <sup>j,l</sup>                             | 13750-16 <sup>j,m</sup><br>13763TR-16 <sup>n</sup> |
|                                | 99890-16           | 99974-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> |   | 13774-16 <sup>j,l</sup>                             | 13750-16 <sup>j,m</sup><br>13763TR-16 <sup>n</sup> |
|                                | 99890-16           | 99974-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> |   | 13774-16 <sup>j,l</sup>                             | 13750-16 <sup>j,m</sup><br>13763TR-16 <sup>n</sup> |
|                                | 99893-16           | 99954-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> | 13801-16 <sup>j,l</sup><br>13801C-16 <sup>k</sup> | 13774-16 <sup>j,l</sup>                             | 13750-16 <sup>j,m</sup><br>13763TR-16 <sup>n</sup> |
|                                | 99893-16           | 99954-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> | 13801-16 <sup>j,l</sup><br>13801C-16 <sup>k</sup> | 13774-16 <sup>j,l</sup>                             | 13750-16 <sup>j,m</sup><br>13763TR-16 <sup>n</sup> |
|                                | 99890-16           | 99974-16           | 99822-16 <sup>b</sup> | 99098-1 <sup>c</sup> | 13634-16 <sup>d</sup><br>13640-16 <sup>e</sup> | 13975-1 <sup>f</sup><br>13984-1 <sup>g</sup><br>13977-1 <sup>h</sup> |   | 13774-16 <sup>j,l</sup>                             | 13750-16 <sup>j,m</sup><br>13763TR-16 <sup>n</sup> |

**Section Continued**

- a Cam, lifter, valve spring and retainer kit, includes installation lubricants.
- b Must machine cylinder heads.
- c Machined steel, heat treated.
- d Heavy wall, heat treated.
- e Pro Series, one piece.
- f Performance steel billet gears and roller chain set.
- g Pro Series steel billet gears and roller chain set.
- h Pro Series steel billet gears and roller chain set with thrust bearing.

- i 1.7 ratio, extra long slot for 1.560" maximum O.D. valve springs.
- j 1991-95 engines require the installation of **99157-16** 7/16" rocker arm studs and **13650-1** pushrod guideplates (machining required).
- k 1.7 ratio, Nitro Carb, extra long slot for 1.560" maximum O.D. valve springs.
- l Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- m 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- n 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number                     | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|--|--|-----------------------|--|-----------------|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Mechanical Lifter Camshafts</b>   |  |                       |  |                 |  |   |                               |  |                     |                               |
| Moderate competition only, good upper RPM HP, 454+ cu.in., bracket racing, auto trans w/race converter, also good w/large manifold nitrous system, 12.0 minimum compression ratio advised. Good w/large Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised. | <b>F-266/3528-2-14</b>                               | 4400-8000             | <b>131151*</b>                             | <b>99250-16</b> | 266<br>276                                 | 302<br>312                                    | 114                           | 22 64<br>75 21                               | .026<br>.026        | .600<br>.620                  |
|  |  |                       | ◆  |                 |  |   |                               |  |                     |                               |
| Moderate competition only, good upper RPM HP, bracket racing, auto trans w/race converter, 12.0 minimum compression ratio advised.   | <b>F-268/3814-2S-8</b>                               | 4600-7800             | <b>131541*</b>                             | <b>99250-16</b> | 268<br>276                                 | 304<br>312                                    | 108                           | 29 59<br>69 27                               | .026<br>.026        | .648<br>.669                  |
|  |  |                       | ◆  |                 |  |   |                               |  |                     |                               |
| Moderate competition only, good upper RPM HP, 460+ cu.in. bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.   | <b>F-270/3867-2S-10</b>                              | 4600-8000             | <b>131161*</b>                             | <b>99250-16</b> | 270<br>276                                 | 300<br>312                                    | 110                           | 29 61<br>71 25                               | .012<br>.026        | .657<br>.620                  |
|  |  |                       | ◆  |                 |  |   |                               |  |                     |                               |
| Moderate competition only, good upper RPM HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.   | <b>F-316-2</b>                                       | 4800-8000             | <b>134771*</b>                             | <b>99250-16</b> | 272<br>280                                 | 316<br>324                                    | 110                           | 30 62<br>74 26                               | .026<br>.026        | .659<br>.679                  |
|  |  |                       | ◆  |                 |  |   |                               |  |                     |                               |
| Competition only, good upper RPM HP, 500+ cu.in., bracket racing, auto trans w/race converter, also good w/large manifold nitrous system, 12.5 minimum compression ratio advised. Good w/large Roots supercharger, 22 lbs. maximum boost w/8.0 maximum compression ratio advised.          | <b>F-272/3874-2S-14</b>                              | 4600-8200             | <b>131291*</b>                             | <b>99250-16</b> | 272<br>280                                 | 308<br>316                                    | 114                           | 26 66<br>78 22                               | .026<br>.026        | .659<br>.679                  |
|  |  |                       | ◆  |                 |  |   |                               |  |                     |                               |
| Competition only, good upper RPM HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.  | <b>F-276/3934-2S-8</b><br><b>F-276/3934-2S-8 SFO</b> | 4800-8200             | <b>131641*</b><br><b>131171*</b>           | <b>99250-16</b> | 276<br>284                                 | 312<br>320                                    | 108                           | 34 62<br>74 30                               | .026<br>.026        | .669<br>.689                  |
|  |  |                       | ◆  |                 |  |   |                               |  |                     |                               |
| Radical competition only, good high RPM HP, flat tap restricted classes, 540+ cu.in., 13.0 minimum compression ratio advised.  | <b>F-280/3994-2S-10</b>                              | 5000-8400             | <b>131761*</b>                             | <b>99250-16</b> | 280<br>288                                 | 316<br>324                                    | 110                           | 33 67<br>77 31                               | .026<br>.026        | .679<br>.699                  |
|  |  |                       | ◆  |                 |  |   |                               |  |                     |                               |
| Radical competition only, good high RPM HP, flat tap restricted classes, 540+ cu.in., good w/manifold nitrous system, 13.0 minimum compression ratio advised. Good w/Roots supercharger, 26 lbs. maximum boost w/8.5 maximum compression ratio advised.                                    | <b>F-280/3994-2S-14</b>                              | 5200-8400             | <b>131181*</b>                             | <b>99250-16</b> | 280<br>288                                 | 316<br>324                                    | 114                           | 30 70<br>82 26                               | .026<br>.026        | .679<br>.699                  |
|  |  |                       | ◆  |                 |  |   |                               |  |                     |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** 1991-95 Gen V engines can use these camshafts and components if they are converted to adjustable rocker arms by machining the cylinder heads for **99157-16** 7/16" screw-in studs and **13650-1** pushrod guideplates, and installing appropriate rocker arms.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

**NOTE:** Camshafts with SFO firing order (1-8-7-3-6-5-4-2, or 4/7 swap), are available on special order. Contact Crane's Performance Consultants for details.

**IMPORTANT NOTE:** Some 1973 thru 1981 454 cu.in. engines were equipped with exhaust valve rotators. In these instances when using dual valve springs, use either our **99459-8** Spring Seat Spacers or 4 of **99948-2** valve spring retainers (on the exhaust valves only) to prevent excessive valve spring shimming when eliminating the rotators. Some later engines were equipped with rotators on both the intake and exhaust valves. For these applications when using dual valve springs, use either 2 of our **99459-8** Spring Seat Spacers or

our **99948-16** valve spring retainers to prevent excessive valve spring shimming when eliminating the rotators. Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360          | See pg. 306                                    | See pg. 328  | See pg. 312       | See pg. 315                        | See pg. 317  |
|--------------------------------|-----------------------|-------------|-----------------------|----------------------|--|--|-------------------|------------------------------------|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ENERGIZER | ROCKERS — GOLD RACE                                  |
|                                | 99890-16              | 99974-16    | 99822-16 <sup>a</sup> | 99098-1 <sup>b</sup> | 13634-16 <sup>c</sup><br>13640-16 <sup>d</sup> | 13975-1 <sup>e</sup><br>13984-1 <sup>f</sup><br>13977-1 <sup>g</sup> |                   | 13774-16 <sup>h,i</sup>            | 13750-16 <sup>h,j</sup><br>13763TR-16 <sup>h,k</sup> |
|                                | 99890-16              | 99974-16    | 99822-16 <sup>a</sup> | 99098-1 <sup>b</sup> | 13634-16 <sup>c</sup><br>13640-16 <sup>d</sup> | 13975-1 <sup>e</sup><br>13984-1 <sup>f</sup><br>13977-1 <sup>g</sup> |                   | 13774-16 <sup>h,i</sup>            | 13750-16 <sup>h,j</sup><br>13763TR-16 <sup>h,k</sup> |
|                                | 99890-16              | 99974-16    | 99822-16 <sup>a</sup> | 99098-1 <sup>b</sup> | 13634-16 <sup>c</sup><br>13640-16 <sup>d</sup> | 13975-1 <sup>e</sup><br>13984-1 <sup>f</sup><br>13977-1 <sup>g</sup> |                   | 13774-16 <sup>h,i</sup>            | 13750-16 <sup>h,j</sup><br>13763TR-16 <sup>h,k</sup> |
|                                | 99890-16              | 99974-16    | 99822-16 <sup>a</sup> | 99098-1 <sup>b</sup> | 13634-16 <sup>c</sup><br>13640-16 <sup>d</sup> | 13975-1 <sup>e</sup><br>13984-1 <sup>f</sup><br>13977-1 <sup>g</sup> |                   | 13774-16 <sup>h,i</sup>            | 13750-16 <sup>h,j</sup><br>13763TR-16 <sup>h,k</sup> |
|                                | 99890-16              | 99974-16    | 99822-16 <sup>a</sup> | 99098-1 <sup>b</sup> | 13634-16 <sup>c</sup><br>13640-16 <sup>d</sup> | 13975-1 <sup>e</sup><br>13984-1 <sup>f</sup><br>13977-1 <sup>g</sup> |                   | 13774-16 <sup>h,i</sup>            | 13750-16 <sup>h,j</sup><br>13763TR-16 <sup>h,k</sup> |
|                                | 99890-16              | 99974-16    | 99822-16 <sup>a</sup> | 99098-1 <sup>b</sup> | 13634-16 <sup>c</sup><br>13640-16 <sup>d</sup> | 13975-1 <sup>e</sup><br>13984-1 <sup>f</sup><br>13977-1 <sup>g</sup> |                   | 13774-16 <sup>h,i</sup>            | 13750-16 <sup>h,j</sup><br>13763TR-16 <sup>h,k</sup> |
|                                | 99890-16 <sup>a</sup> | 99974-16    | 99822-16 <sup>a</sup> | 99098-1 <sup>b</sup> | 13634-16 <sup>c</sup><br>13640-16 <sup>d</sup> | 13975-1 <sup>e</sup><br>13984-1 <sup>f</sup><br>13977-1 <sup>g</sup> |                   | 13774-16 <sup>h,i</sup>            | 13750-16 <sup>h,j</sup><br>13763TR-16 <sup>h,k</sup> |
|                                | 99890-16 <sup>a</sup> | 99974-16    | 99822-16 <sup>a</sup> | 99098-1 <sup>b</sup> | 13634-16 <sup>c</sup><br>13640-16 <sup>d</sup> | 13975-1 <sup>e</sup><br>13984-1 <sup>f</sup><br>13977-1 <sup>g</sup> |                   | 13774-16 <sup>h,i</sup>            | 13750-16 <sup>h,j</sup><br>13763TR-16 <sup>h,k</sup> |

**a** Must machine cylinder heads.

**b** Machined steel, heat treated.

**c** Heavy wall, heat treated.

**d** Pro Series, one piece.

**e** Performance steel billet gears and roller chain set.

**f** Pro Series steel billet gears and roller chain set.

**g** Pro Series steel billet gears and roller chain set with thrust bearing.

**h** 1991-95 engines require the installation of **99157-16** 7/16" rocker arm studs and **13650-1** pushrod guideplates (machining required).

**i** Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.

**j** 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.

**k** 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |      |
|---|----------------------------------|-----------------------|--|---------|--|---|-------------------------------|--|-----------------------------|-------------------------------|------|
| Excellent low end and mid range torque and HP, good idle, moderate performance usage, marine performance, mild bracket racing, auto trans w/3000+ converter, good with plate nitrous system, 3400-3800 cruise RPM, 10.5 to 11.5 compression ratio advised. Good w/supercharger, 10 lbs. maximum boost w/8.5 maximum compression ratio advised.                  | SR-238/350-2S-12 IG              | 2800-6600             | 138551 <sup>a</sup>                        | 3       | 13519-16 <sup>c</sup>                      | 238   | 288                           | 112  | 12 46                       | .020                          | .595 |
|   |                                  |                       |  |         | 13570-16 <sup>d</sup>                      | 246   | 296                           | 60 6   | .020                        | .615                          |      |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, marine performance, radical off road, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised.  | SR-246/362-2S-10 IG              | 3000-6800             | 138601 <sup>a</sup>                        | 3       | 13519-16 <sup>c</sup>                      | 246   | 296                           | 110  | 18 48                       | .020                          | .615 |
|   |                                  |                       |  |         | 13570-16 <sup>d</sup>                      | 254   | 304                           | 62 12  | .020                        | .636                          |      |
| Excellent mid range torque & HP, fair idle, moderate performance usage, marine performance, good w/manifold nitrous system, mild bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised. Good w/supercharger, 16 lbs. max. boost w/8.0 max. compress. ratio advised.  | SR-246/362-2S-14 IG              | 3200-6800             | 138781 <sup>a</sup>                        | 3       | 13519-16 <sup>c</sup>                      | 246   | 296                           | 114  | 14 52                       | .020                          | .615 |
|   |                                  |                       |  |         | 13570-16 <sup>d</sup>                      | 254   | 304                           | 66 8   | .020                        | .636                          |      |
| Excellent mid range torque & HP, fair idle, performance usage, good w/manifold nitrous system, mild bracket racing, auto trans w/3500+ converter, 10.5 to 12.0 compression ratio advised. Good w/supercharger, 16 lbs. max. boost w/8.0 max. compress. ratio advised.   | R-246/420-2-14 IG                | 3200-7000             | 138141 <sup>*</sup>                        | 3       | 13519-16 <sup>c</sup>                      | 246   | 278                           | 114  | 13 53                       | .020                          | .714 |
|   |                                  |                       |  |         | 13570-16 <sup>d</sup>                      | 256   | 288                           | 66 10  | .020                        | .714                          |      |
| Good mid range torque and HP, performance usage, bracket racing, Heavy, Pro, etc., auto trans w/race converter, 11.0 to 12.5 compression ratio advised.   | R-250/420-2S-10                  | 3200-7000             | 138871 <sup>b</sup>                        | 3       | 13519-16 <sup>c</sup>                      | 250   | 282                           | 110  | 19 51                       | .020                          | .714 |
|   |                                  |                       |  |         | 13570-16 <sup>d</sup>                      | 258   | 290                           | 63 15  | .020                        | .714                          |      |
| Good mid range to upper RPM torque & HP, rough idle, performance usage, marine performance, bracket racing, auto transmission w/4000+ converter, 4200-4600 cruise RPM, 11.0 minimum compression ratio advised, 480+ cu.in., mild supercharged and/or nitrous.   | SR-254/374-2S-12 IG              | 3400-7200             | 138631 <sup>a</sup>                        | 3       | 13519-16 <sup>c</sup>                      | 254   | 304                           | 112  | 20 54                       | .020                          | .636 |
|   |                                  |                       |  |         | 13570-16 <sup>d</sup>                      | 262   | 312                           | 68 14  | .020                        | .636                          |      |
| Performance usage, good low and mid range torque and HP, bracket racing, auto trans w/3500+ converter, 11.0 to 12.5 maximum compression ratio advised. Good w/manifold nitrous system. Good w/Roots supercharger, 18 lbs. maximum boost w/8.0 maximum compression ratio advised.  | R-254/420-2S1-12 IG              | 3600-7200             | 138101 <sup>a</sup>                        | 3       | 13519-16 <sup>c</sup>                      | 254   | 286                           | 112  | 19 55                       | .020                          | .714 |
|   |                                  |                       |  |         | 13570-16 <sup>d</sup>                      | 262   | 294                           | 67 15  | .020                        | .714                          |      |
| Good mid range to upper RPM torque & HP, rough idle, performance usage, 480+ cu.in., radical marine performance, Pro Street, bracket racing, auto trans w/3500+ converter, 4200-4600 cruise RPM, 11.0 min. compression ratio advised. Good w/manifold nitrous system. Good w/Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised. | SR-254/374-2S-14 IG              | 3600-7200             | 138791 <sup>a</sup>                        | 3       | 13519-16 <sup>c</sup>                      | 254   | 304                           | 114  | 18 56                       | .020                          | .636 |
|   |                                  |                       |  |         | 13570-16 <sup>d</sup>                      | 262   | 312                           | 70 12  | .020                        | .636                          |      |
| Performance usage, bracket racing, good mid range torque and HP, Heavy, Pro, etc., auto trans w/race converter, 11.0 to 12.5 compression ratio advised.   | R-254/420-2-10                   | 3800-7200             | 138881 <sup>b</sup>                        | 3       | 13519-16 <sup>c</sup>                      | 254   | 286                           | 110  | 21 53                       | .020                          | .714 |
|   |                                  |                       |  |         | 13570-16 <sup>d</sup>                      | 264   | 296                           | 66 18  | .020                        | .714                          |      |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**IMPORTANT NOTE:** 1991-95 Gen V engines can use these camshafts and components if they are converted to adjustable rocker arms by machining the cylinder heads for 99157-16 7/16" screw-in studs and 13650-1 pushrod guideplates, and installing appropriate rocker arms.

**NOTE:** Many options are available for these camshafts, and any of our custom ground camshafts. An iron distributor drive gear and rear journal can be specified. SFO firing order (4/7 swap) is offered. Optional journal sizes are: Roller Bearing (1.968"), 2.125", and 55mm (2.165"). Gun drilling (where applicable) is available. Camshafts for the GM DRCE family of V-8's are also offered in 55mm and 60mm journal versions.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337  | See pg. 350   | See pg. 362                                      | See pg. 360  | See pg. 306                                    | See pg. 328  | See pg. 312       | See pg. 315                         | See pg. 317  |
|--------------------------------|--|---|--|--|--|--|-------------------|-------------------------------------|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS  | RETAINERS   | VALVE STEM SEALS                                 | VALVE STEM LOCKS   | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ ENERGIZER | ROCKERS — GOLD RACE                                |
|                                | 99876-16 <sup>e</sup><br>96883-16 <sup>ef</sup><br>99832-16 <sup>w</sup> | 99955-16<br>99676-16 <sup>g</sup><br>99678-16 <sup>h</sup><br>99976-16 <sup>t</sup> | 99822-16 <sup>ei</sup><br>99820-16 <sup>ej</sup> | 99098-1 <sup>k</sup><br>99094-1 <sup>l</sup><br>99097-1 <sup>m</sup> | 13634-16 <sup>n</sup><br>13640-16 <sup>o</sup> | 13975-1 <sup>p</sup><br>13984-1 <sup>q</sup><br>13977-1 <sup>r</sup> |                   | 13774-16 <sup>st</sup>              | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>uv</sup> |
|                                | 99876-16 <sup>e</sup><br>96883-16 <sup>ef</sup><br>99832-16 <sup>w</sup> | 99955-16<br>99676-16 <sup>g</sup><br>99678-16 <sup>h</sup><br>99976-16 <sup>t</sup> | 99822-16 <sup>ei</sup><br>99820-16 <sup>ej</sup> | 99098-1 <sup>k</sup><br>99094-1 <sup>l</sup><br>99097-1 <sup>m</sup> | 13634-16 <sup>n</sup><br>13640-16 <sup>o</sup> | 13975-1 <sup>p</sup><br>13984-1 <sup>q</sup><br>13977-1 <sup>r</sup> |                   | 13774-16 <sup>st</sup>              | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>uv</sup> |
|                                | 99876-16 <sup>e</sup><br>96883-16 <sup>ef</sup><br>99832-16 <sup>w</sup> | 99955-16<br>99676-16 <sup>g</sup><br>99678-16 <sup>h</sup><br>99976-16 <sup>t</sup> | 99822-16 <sup>ei</sup><br>99820-16 <sup>ej</sup> | 99098-1 <sup>k</sup><br>99094-1 <sup>l</sup><br>99097-1 <sup>m</sup> | 13634-16 <sup>n</sup><br>13640-16 <sup>o</sup> | 13975-1 <sup>p</sup><br>13984-1 <sup>q</sup><br>13977-1 <sup>r</sup> |                   | 13774-16 <sup>st</sup>              | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>uv</sup> |
|                                | 96886-16 <sup>e</sup>  | 99955-16<br>99676-16 <sup>g</sup><br>99678-16 <sup>h</sup>                          | 99822-16 <sup>ei</sup><br>99820-16 <sup>ej</sup> | 99098-1 <sup>k</sup><br>99094-1 <sup>l</sup><br>99097-1 <sup>m</sup> | 13634-16 <sup>n</sup><br>13640-16 <sup>o</sup> | 13975-1 <sup>p</sup><br>13984-1 <sup>q</sup><br>13977-1 <sup>r</sup> |                   | 13774-16 <sup>st</sup>              | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>uv</sup> |
|                                | 96886-16 <sup>e</sup>  | 99955-16<br>99676-16 <sup>g</sup><br>99678-16 <sup>h</sup>                          | 99822-16 <sup>ei</sup><br>99820-16 <sup>ej</sup> | 99098-1 <sup>k</sup><br>99094-1 <sup>l</sup><br>99097-1 <sup>m</sup> | 13634-16 <sup>n</sup><br>13640-16 <sup>o</sup> | 13975-1 <sup>p</sup><br>13984-1 <sup>q</sup><br>13977-1 <sup>r</sup> |                   | 13774-16 <sup>st</sup>              | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>uv</sup> |
|                                | 99876-16 <sup>e</sup><br>96883-16 <sup>ef</sup><br>99832-16 <sup>w</sup> | 99955-16<br>99676-16 <sup>g</sup><br>99678-16 <sup>h</sup><br>99976-16 <sup>t</sup> | 99822-16 <sup>ei</sup><br>99820-16 <sup>ej</sup> | 99098-1 <sup>k</sup><br>99094-1 <sup>l</sup><br>99097-1 <sup>m</sup> | 13634-16 <sup>n</sup><br>13640-16 <sup>o</sup> | 13975-1 <sup>p</sup><br>13984-1 <sup>q</sup><br>13977-1 <sup>r</sup> |                   | 13774-16 <sup>st</sup>              | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>uv</sup> |
|                                | 96886-16 <sup>e</sup>  | 99955-16<br>99676-16 <sup>g</sup><br>99678-16 <sup>h</sup>                          | 99822-16 <sup>ei</sup><br>99820-16 <sup>ej</sup> | 99098-1 <sup>k</sup><br>99094-1 <sup>l</sup><br>99097-1 <sup>m</sup> | 13634-16 <sup>n</sup><br>13640-16 <sup>o</sup> | 13975-1 <sup>p</sup><br>13984-1 <sup>q</sup><br>13977-1 <sup>r</sup> |                   | 13774-16 <sup>st</sup>              | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>uv</sup> |
|                                | 99876-16 <sup>e</sup><br>96883-16 <sup>ef</sup><br>99832-16 <sup>w</sup> | 99955-16<br>99676-16 <sup>g</sup><br>99678-16 <sup>h</sup><br>99976-16 <sup>t</sup> | 99822-16 <sup>ei</sup><br>99820-16 <sup>ej</sup> | 99098-1 <sup>k</sup><br>99094-1 <sup>l</sup><br>99097-1 <sup>m</sup> | 13634-16 <sup>n</sup><br>13640-16 <sup>o</sup> | 13975-1 <sup>p</sup><br>13984-1 <sup>q</sup><br>13977-1 <sup>r</sup> |                   | 13774-16 <sup>st</sup>              | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>uv</sup> |
|                                | 96886-16 <sup>e</sup>  | 99955-16<br>99676-16 <sup>g</sup><br>99678-16 <sup>h</sup>                          | 99822-16 <sup>ei</sup><br>99820-16 <sup>ej</sup> | 99098-1 <sup>k</sup><br>99094-1 <sup>l</sup><br>99097-1 <sup>m</sup> | 13634-16 <sup>n</sup><br>13640-16 <sup>o</sup> | 13975-1 <sup>p</sup><br>13984-1 <sup>q</sup><br>13977-1 <sup>r</sup> |                   | 13774-16 <sup>st</sup>              | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>uv</sup> |

**Section Continued**

- a Requires cam button spacer, camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b Requires cam button spacer and a **11990-1** (.489" I.D.) or **11989-1** (.500" I.D. Accel) aluminum-bronze distributor drive gear. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- c Vertical locking bar roller lifters.
- d Ultra Pro Series vertical locking bar roller lifters.
- e Must machine cylinder heads.
- f For supercharged applications, use **99679-16** or **99678-16** retainers.
- g Titanium for 3/8" dia. valve stems, must use **99098-1** valve stem locks, included with the retainers.
- h Titanium for 11/32" dia. valve stems, must use **99097-1** valve stem locks, included with the retainers.
- i For 3/8" dia. valve stems.
- j For 11/32" dia. valve stems.
- k Machined steel, heat treated for 3/8" dia. valve stems.
- l Machined steel, heat treated, for 11/32" diameter valve stems, Multi Fit.
- m Machined steel, heat treated for 11/32" dia. valve stems.
- n Heavy wall, heat treated.
- o Pro Series one-piece.
- p Performance steel billet gears and roller chain set.
- q Pro Series steel billet gears and roller chain set.
- r Pro Series steel billet gears and roller chain set with thrust bearing.
- s 1991-95 engines require the installation of **99157-16** 7/16" rocker arm studs and **13650-1** pushrod guideplates (machining required).
- t Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- u 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- v 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.
- w Ovate wire beehive spring, requires **99976-16** retainers.
- x Steel, for **99832-16** beehive springs.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application  | Camshaft Series/<br>Grind Number                       | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code               | LIFTERS | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|--|-----------------------|--|---------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| Performance usage, good upper RPM torque and HP, radical marine performance, bracket racing, auto trans w/race converter, 12.0 min. compression ratio advised.   | <b>R-258/420-251-14 IG</b>                             | 4000-7200             | <b>138681<sup>a</sup></b>                                |         | <b>13519-16<sup>d</sup></b>                | 258   | 290                           | 114  | 19 59                       | .020 .714                     |
|  |  |                       |  |         | <b>13570-16<sup>e</sup></b>                | 262   | 294                           | 69 13  | .020 .714                   |                               |
| Performance usage, bracket racing, good mid range torque and HP, Heavy, Pro, etc., auto trans w/race converter, 12.0 minimum compression ratio advised.  | <b>R-258/420-25-8</b>                                  | 4000-7200             | <b>138891<sup>b</sup></b>                                |         | <b>13519-16<sup>d</sup></b>                | 258   | 290                           | 108  | 25 53                       | .020 .714                     |
|  |  |                       |  |         | <b>13570-16<sup>e</sup></b>                | 266   | 298                           | 65 21  | .020 .714                   |                               |
| Good upper RPM HP, rough idle, performance usage, marine performance, bracket racing, auto trans w/4000+ converter, 4400-4800 cruise RPM, 11.5 minimum compression ratio advised, 540+ cu.in. Good w/ large manifold nitrous system. Good w/large Roots supercharger, 22 lbs. maximum boost w/8.0 maximum compression ratio advised. | <b>SR-262/374-251-14 IG</b>                            | 4200-7400             | <b>138641<sup>a</sup></b>                                |         | <b>13519-16<sup>d</sup></b>                | 262   | 312                           | 114  | 22 60                       | .020 .636                     |
|  |  |                       |  |         | <b>13570-16<sup>e</sup></b>                | 270   | 320                           | 74 16  | .020 .636                   |                               |
| Performance usage, good mid range torque and HP, 480+ cu.in., bracket racing, auto trans w/4000+ converter, 11.5 minimum compression ratio advised. Good w/large manifold nitrous system. Good w/large Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised.  | <b>R-262/420-251-14 IG</b>                             | 4200-7600             | <b>138131<sup>a</sup></b>                                |         | <b>13519-16<sup>d</sup></b>                | 262   | 294                           | 114  | 21 61                       | .020 .714                     |
|  |  |                       |  |         | <b>13570-16<sup>e</sup></b>                | 270   | 302                           | 73 17  | .020 .714                   |                               |
| Performance usage, bracket racing, w/heavy car, good mid range torque and HP, Pro, Super Pro, oval track, Modified, etc., auto trans w/race converter, 12.0 minimum compression ratio advised.   | <b>R-262/420-2-6</b>                                   | 4200-7200             | <b>138801<sup>b</sup></b>                                |         | <b>13519-16<sup>d</sup></b>                | 262   | 294                           | 106  | 28 54                       | .020 .714                     |
|  |  |                       |  |         | <b>13570-16<sup>e</sup></b>                | 272   | 304                           | 65 27  | .020 .714                   |                               |
| Performance usage, bracket racing, good mid to upper RPM torque and HP, Pro, Super Pro, etc., auto trans w/race converter, oval track, Modified, etc., 12.0 minimum compression ratio advised.   | <b>R-262/420-2-10</b>                                  | 4200-7400             | <b>138811<sup>b</sup></b>                                |         | <b>13519-16<sup>d</sup></b>                | 262   | 294                           | 110  | 25 57                       | .020 .714                     |
|  |  |                       |  |         | <b>13570-16<sup>e</sup></b>                | 272   | 304                           | 70 22  | .020 .714                   |                               |
| Performance usage, bracket racing w/heavy car, good mid to upper RPM torque and HP, Pro, Super Pro, etc., auto trans w/race converter, oval track, Modified, etc., 12.0 minimum compression ratio advised.   | <b>R-268/420-25-8</b><br><b>R-268/420-25-8 SFO</b>     | 4400-7600             | <b>138831<sup>b</sup></b><br><b>138671<sup>b,c</sup></b> |         | <b>13519-16<sup>d</sup></b>                | 268   | 300                           | 108  | 30 58                       | .020 .714                     |
|  |  |                       |  |         | <b>13570-16<sup>e</sup></b>                | 272   | 304                           | 68 24  | .020 .714                   |                               |
| Competition only, good upper RPM HP, 480+ cu.in., bracket racing, auto trans w/race converter, good w/large manifold nitrous system, 12.5 minimum compression ratio advised. Good w/large Roots supercharger, 22 lbs. maximum boost w/8.0 maximum compression ratio advised.   | <b>R-270/420-252-14</b>                                | 4400-7800             | <b>138661<sup>b</sup></b>                                |         | <b>13519-16<sup>d</sup></b>                | 270   | 302                           | 114  | 25 65                       | .020 .714                     |
|  |  |                       |  |         | <b>13570-16<sup>e</sup></b>                | 278   | 310                           | 77 21  | .020 .714                   |                               |
| Performance usage, bracket racing, good mid to upper RPM torque and HP, Super Pro, etc., auto trans w/race converter, oval track, Super Modified, 12.5 minimum compression ratio advised.  | <b>R-272/420-251-10</b>                                | 4400-7800             | <b>138841<sup>b</sup></b>                                |         | <b>13519-16<sup>d</sup></b>                | 272   | 304                           | 110  | 30 62                       | .020 .714                     |
|  |  |                       |  |         | <b>13570-16<sup>e</sup></b>                | 278   | 310                           | 73 25  | .020 .714                   |                               |
| Competition only, bracket racing, good upper RPM torque and HP, Super Pro, Super Gas, Super Comp, auto transmission w/race converter, 12.5 minimum compression ratio advised.  | <b>R-274/4334-25-10</b><br><b>R-274/4334-25-10 SFO</b> | 4600-8000             | <b>138291<sup>b</sup></b><br><b>138301<sup>b,c</sup></b> |         | <b>13519-16<sup>d</sup></b>                | 274   | 314                           | 110  | 30 64                       | .026 .737                     |
|  |  |                       |  |         | <b>13570-16<sup>e</sup></b>                | 284   | 324                           | 75 29  | .026 .726                   |                               |
|  |  |                       |  |         | <b>13574-16<sup>f</sup></b>                |   |                               |  |                             |                               |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**IMPORTANT NOTE:** 1991-95 Gen V engines can use these camshafts and components if they are converted to adjustable rocker arms by machining the cylinder heads for **99157-16** 7/16" screw-in studs and **13650-1** pushrod guideplates, and installing appropriate rocker arms.

**NOTE:** Many options are available for these camshafts, and any of our custom ground camshafts. An iron distributor drive gear and rear journal can be specified. SFO firing order (4/7 swap) is offered. Optional journal sizes are: Roller Bearing (1.968"), 2.125", and 55mm (2.165"). Gun drilling (where applicable) is available. Camshafts for the GM DRCE family of V-8's are also offered in 55mm and 60mm journal versions.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                       | See pg. 350   | See pg. 362  | See pg. 360  | See pg. 306                                    | See pg. 328  | See pg. 312       | See pg. 315   | See pg. 317  |
|--------------------------------|---|---|--|--|--|--|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                     | RETAINERS   | VALVE STEM SEALS                                   | VALVE STEM LOCKS   | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 96886-16 <sup>g</sup>                             | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup>                          | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   |   | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |
|                                | 96886-16 <sup>g</sup>                             | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup>                          | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   |   | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |
|                                | 99876-16 <sup>g</sup><br>96883-16 <sup>g,h</sup>  | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup>                          | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   | 13774-16 <sup>u,v</sup>                             | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |
|                                | 96886-16 <sup>g</sup>                             | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup>                          | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   |   | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |
|                                | 96886-16 <sup>g</sup>                             | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup>                          | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   |   | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |
|                                | 99876-16 <sup>g</sup><br>96883-16 <sup>g,h</sup>  | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup>                          | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   |   | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |
|                                | 96886-16 <sup>g</sup>                             | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup>                          | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   |   | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |
|                                | 96886-16 <sup>g</sup>                             | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup>                          | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   |   | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |
|                                | 96886-16 <sup>g</sup>                             | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup>                          | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   |   | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |
|                                | 96886-16 <sup>g</sup>                             | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup>                          | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   |   | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |
|                                | 96886-16 <sup>g</sup><br>961226-16 <sup>g,v</sup> | 99955-16<br>99676-16 <sup>i</sup><br>99678-16 <sup>j</sup><br>99661-16 <sup>z</sup> | 99822-16 <sup>g,k</sup><br>99820-16 <sup>g,l</sup> | 99098-1 <sup>m</sup><br>99094-1 <sup>n</sup><br>99097-1 <sup>o</sup> | 13634-16 <sup>p</sup><br>13640-16 <sup>q</sup> | 13975-1 <sup>r</sup><br>13984-1 <sup>s</sup><br>13977-1 <sup>t</sup> |                   |   | 13750-16 <sup>u,w</sup><br>13763TR-16 <sup>u,x</sup> |

Section Continued

- a Requires cam button spacer, camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b Requires cam button spacer and a **11990-1** (.489" I.D.) or **11989-1** (.500" I.D. Accel) aluminum-bronze distributor drive gear. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- c Camshaft has SFO firing order, with 4/7 swap.
- d Vertical locking bar roller lifters.
- e Ultra Pro Series vertical locking bar roller lifters.
- f Ultra Pro Series vertical locking bar roller lifters for .904" diameter lifter bores.
- g Must machine cylinder heads.
- h For supercharged applications, use **99679-16** or **99678-16** retainers.
- i Titanium for 3/8" dia. valve stems, must use **99098-1** valve stem locks, included with the retainers.
- j Titanium for 11/32" dia. valve stems, must use **99097-1** valve stem locks, included with the retainers.
- k For 3/8" dia. valve stems.
- l For 11/32" dia. valve stems.
- m Machined steel, heat treated for 3/8" dia. valve stems.
- n Machined steel, heat treated, for 11/32" diameter valve stems, Multi Fit.
- o Machined steel, heat treated for 11/32" dia. valve stems.
- p Heavy wall, heat treated.
- q Pro Series one-piece.
- r Performance steel billet gears and roller chain set.
- s Pro Series steel billet gears and roller chain set.
- t Pro Series steel billet gears and roller chain set with thrust bearing.
- u 1991-95 engines require the installation of **99157-16** 7/16" rocker arm studs and **13650-1** pushrod guideplates (machining required).
- v Crane Classic extruded, 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- w 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- x 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.
- y Requires **99661-16** titanium retainers.
- z Titanium, requires Crane Multi Fit valve stem locks.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number  | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh.     | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|---|---|-----------------------|--|--|--|---|-------------------------------|--|---------------------|-------------------------------|
| Competition only, good upper RPM HP, 500+ cu.in., bracket racing, auto trans w/race converter, good w/ large manifold nitrous system, 12.5 minimum compression ratio advised. Good w/large Roots supercharger, 24 lbs. maximum boost w/8.0 maximum compression ratio advised. | R-274/4334-2S-14  | 4600-                 | 138351 <sup>a</sup>                        | 13570-16 <sup>d</sup>                          | 274  | 314   | 114                           | 26 68  | .026                | .737                          |
|   | R-274/4334-2S-14 SFO  | 8200                  | 138361 <sup>a,b</sup>                      | 13574-16 <sup>e</sup>                          | 284  | 324   |                               | 79 25  | .026                | .726                          |
| Radical competition only, good upper RPM HP, 500+ cu.in., bracket racing, Pro Street, auto trans w/race converter, intended for large manifold nitrous system, 12.5 minimum compression ratio advised.  | R-274/5002-2S-14 SFO  | 4600-<br>8600         | 138931 <sup>a,b</sup>                      | 13570-16 <sup>d</sup><br>13574-16 <sup>e</sup> | 274<br>300                                     | 304<br>331                                    | 114                           | 28 66<br>89 31                               | .020<br>.016        | .850<br>.818                  |
|   | Competition only, good upper RPM torque and HP, 540+ cu.in., bracket racing w/heavy car, auto trans w/race converter, marine performance, good w/manifold nitrous system, 12.5 minimum compression ratio advised. Good w/large Roots supercharger, 24 lbs. maximum boost w/8.0 maximum compression ratio advised. | R-276/420-2S1-14      | 4600-                                      | 138451 <sup>a</sup>                            | 13570-16 <sup>d</sup>                          | 276   | 308                           | 114  | 28 68               | .020                          |
| R-276/420-2S1-14 IG   |   | 8200                  | 138461 <sup>c</sup>                        | 13574-16 <sup>e</sup>                          | 280  | 312   |                               | 78 22  | .020                | .714                          |
| Competition only, bracket racing, good upper RPM torque and HP, Super Pro, Super Gas, Super Comp, etc., 427-468 cu.in., auto trans w/race converter, 12.5 minimum compression ratio advised.  | R-278/420-2S-10   | 4600-<br>8000         | 138851 <sup>a</sup>                        | 13570-16 <sup>d</sup><br>13574-16 <sup>e</sup> | 278<br>282                                     | 310<br>314                                    | 110                           | 33 65<br>75 27                               | .020                | .714                          |
|   | Competition only, good upper RPM torque and HP, 540+ cu.in., bracket racing, auto trans w/race converter, good w/manifold nitrous system, 12.5 minimum compression ratio advised. Good w/large Roots supercharger, 26 lbs. maximum boost w/8.0 maximum compression ratio advised.                                 | R-278/420-2-14 IG     | 4600-<br>8200                              | 138471 <sup>c</sup>                            | 13570-16 <sup>d</sup><br>13574-16 <sup>e</sup> | 278<br>288                                    | 310<br>320                    | 114  | 29 69<br>82 26      | .020                          |
| Competition only, bracket racing, good upper RPM HP, Super Pro, Super Comp, etc., 454+ cu.in., auto trans w/race converter, 12.5 minimum compression ratio advised.   |   | R-282/420-2-12        | 4800-<br>8200                              | 138861 <sup>a</sup>                            | 13570-16 <sup>d</sup><br>13574-16 <sup>e</sup> | 282<br>292                                    | 314<br>324                    | 112  | 33 69<br>81 31      | .020                          |
|   | Radical competition only, good upper RPM HP, 540+ cu.in., bracket racing, Pro Street, auto trans w/race converter, intended for large manifold nitrous system, 13.5 minimum compression ratio advised.  | R-282/490-2S2-13 SFO  | 4800-<br>8600                              | 138941 <sup>a,b</sup>                          | 13570-16 <sup>d</sup><br>13574-16 <sup>e</sup> | 282<br>304                                    | 318<br>339                    | 113  | 33 69<br>88.5 35.5  | .026<br>.022                  |
| Competition only, drag racing Super Stock, 396-427 high compression. Lift with 1.75 intake, 1.7 exhaust rockers.  |   | R-282/5002-2S-10 SFO  | 5000-<br>8200                              | 138711 <sup>a,b</sup>                          | 13570-16 <sup>d</sup><br>13574-16 <sup>e</sup> | 282<br>286                                    | 312<br>330                    | 110  | 36 66<br>78 28      | .020<br>.030                  |
|   | Competition only, good upper RPM HP, single 4-bbl, Comp. Elim., 427+ cu.in., strong mid range for 540+ cu.in. Super Gas and Super Comp, auto transmission w/race converter, 13.0 minimum compression ratio advised.   | R-284/456-2S1-10      | 4800-                                      | 138591 <sup>a</sup>                            | 13570-16 <sup>d</sup>                          | 284   | 324                           | 110  | 35 69               | .026                          |
| R-284/456-2S1-10 SFO  |   | 8200                  | 138701 <sup>a,b</sup>                      | 13574-16 <sup>e</sup>                          | 292  | 332   |                               | 79 33  | .026                | .723                          |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**IMPORTANT NOTE:** 1991-95 Gen V engines can use these camshafts and components if they are converted to adjustable rocker arms by machining the cylinder heads for 99157-16 7/16" screw-in studs and 13650-1 pushrod guideplates, and installing appropriate rocker arms.

**NOTE:** Many options are available for these camshafts, and any of our custom ground camshafts. An iron distributor drive gear and rear journal can be specified. SFO firing order (4/7 swap) is offered. Optional journal sizes are: Roller Bearing (1.968"), 2.125", and 55mm (2.165"). Gun drilling (where applicable) is available. Camshafts for the GM DRCE family of V-8's are also offered in 55mm and 60mm journal versions.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337  | See pg. 350   | See pg. 362                                      | See pg. 360  | See pg. 306                                    | See pg. 328  | See pg. 312       | See pg. 315   | See pg. 317  |
|--------------------------------|--|---|--|--|--|--|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS  | RETAINERS   | VALVE STEM SEALS                                 | VALVE STEM LOCKS   | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY                                       | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 96886-16 <sup>f</sup><br>96848-16 <sup>fg</sup><br>961226-16 <sup>fw</sup> | 99955-16<br>99676-16 <sup>b</sup><br>99678-16 <sup>i</sup><br>99661-16 <sup>v</sup> | 99822-16 <sup>sj</sup><br>99820-16 <sup>sk</sup> | 99098-1 <sup>i</sup><br>99094-1 <sup>m</sup><br>99097-1 <sup>n</sup> | 13634-16 <sup>o</sup><br>13640-16 <sup>p</sup> | 13975-1 <sup>q</sup><br>13984-1 <sup>r</sup><br>13977-1 <sup>s</sup> |                   |   | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>vy</sup> |
|                                | 96848-16 <sup>fg</sup><br>961356-16 <sup>x</sup>                           | 99676-16 <sup>b</sup><br>99678-16 <sup>i</sup><br>99663-16 <sup>z</sup>             | 99822-16 <sup>sj</sup><br>99820-16 <sup>sk</sup> | 99098-1 <sup>i</sup><br>99097-1 <sup>n</sup>                         | 13640-16 <sup>p</sup>                          | 13984-1 <sup>r</sup><br>13977-1 <sup>s</sup>                         |                   |   | 13763TR-16 <sup>vy</sup>                           |
|                                | 96886-16 <sup>f</sup><br>96848-16 <sup>fg</sup>                            | 99955-16<br>99676-16 <sup>b</sup><br>99678-16 <sup>i</sup>                          | 99822-16 <sup>sj</sup><br>99820-16 <sup>sk</sup> | 99098-1 <sup>i</sup><br>99094-1 <sup>m</sup><br>99097-1 <sup>n</sup> | 13634-16 <sup>o</sup><br>13640-16 <sup>p</sup> | 13975-1 <sup>q</sup><br>13984-1 <sup>r</sup><br>13977-1 <sup>s</sup> |                   |   | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>vy</sup> |
|                                | 96886-16 <sup>f</sup><br>96848-16 <sup>fg</sup>                            | 99955-16<br>99676-16 <sup>b</sup><br>99678-16 <sup>i</sup>                          | 99822-16 <sup>sj</sup><br>99820-16 <sup>sk</sup> | 99098-1 <sup>i</sup><br>99094-1 <sup>m</sup><br>99097-1 <sup>n</sup> | 13634-16 <sup>o</sup><br>13640-16 <sup>p</sup> | 13975-1 <sup>q</sup><br>13984-1 <sup>r</sup><br>13977-1 <sup>s</sup> |                   |   | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>vy</sup> |
|                                | 96886-16 <sup>f</sup><br>96848-16 <sup>fg</sup>                            | 99955-16<br>99676-16 <sup>b</sup><br>99678-16 <sup>i</sup>                          | 99822-16 <sup>sj</sup><br>99820-16 <sup>sk</sup> | 99098-1 <sup>i</sup><br>99094-1 <sup>m</sup><br>99097-1 <sup>n</sup> | 13634-16 <sup>o</sup><br>13640-16 <sup>p</sup> | 13975-1 <sup>q</sup><br>13984-1 <sup>r</sup><br>13977-1 <sup>s</sup> |                   |   | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>vy</sup> |
|                                | 96886-16 <sup>f</sup><br>96848-16 <sup>fg</sup>                            | 99955-16<br>99676-16 <sup>b</sup><br>99678-16 <sup>i</sup>                          | 99822-16 <sup>sj</sup><br>99820-16 <sup>sk</sup> | 99098-1 <sup>i</sup><br>99094-1 <sup>m</sup><br>99097-1 <sup>n</sup> | 13634-16 <sup>o</sup><br>13640-16 <sup>p</sup> | 13975-1 <sup>q</sup><br>13984-1 <sup>r</sup><br>13977-1 <sup>s</sup> |                   |   | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>vy</sup> |
|                                | 96848-16 <sup>fg</sup><br>961356-16 <sup>x</sup>                           | 99676-16 <sup>b</sup><br>99678-16 <sup>i</sup><br>99663-16 <sup>z</sup>             | 99822-16 <sup>sj</sup><br>99820-16 <sup>sk</sup> | 99098-1 <sup>i</sup><br>99097-1 <sup>n</sup>                         | 13640-16 <sup>p</sup>                          | 13984-1 <sup>r</sup><br>13977-1 <sup>s</sup>                         |                   |   | 13763TR-16 <sup>vy</sup>                           |
|                                | 96848-16 <sup>fg</sup><br>961356-16 <sup>x</sup>                           | 99676-16 <sup>b</sup><br>99678-16 <sup>i</sup><br>99663-16 <sup>z</sup>             | 99822-16 <sup>sj</sup><br>99820-16 <sup>sk</sup> | 99098-1 <sup>i</sup><br>99097-1 <sup>n</sup>                         | 13640-16 <sup>p</sup>                          | 13984-1 <sup>r</sup><br>13977-1 <sup>s</sup>                         |                   |   | 13763TR-16 <sup>vy</sup>                           |
|                                | 96886-16 <sup>f</sup><br>96848-16 <sup>fg</sup><br>961226-16 <sup>fw</sup> | 99955-16<br>99676-16 <sup>b</sup><br>99678-16 <sup>i</sup><br>99661-16 <sup>v</sup> | 99822-16 <sup>sj</sup><br>99820-16 <sup>sk</sup> | 99098-1 <sup>i</sup><br>99094-1 <sup>m</sup><br>99097-1 <sup>n</sup> | 13634-16 <sup>o</sup><br>13640-16 <sup>p</sup> | 13975-1 <sup>q</sup><br>13984-1 <sup>r</sup><br>13977-1 <sup>s</sup> |                   |   | 13750-16 <sup>tu</sup><br>13763TR-16 <sup>vy</sup> |

**Section Continued**

- a** Requires cam button spacer and a **11990-1** (.489" I.D.) or **11989-1** (.500" I.D. Accel) aluminum-bronze distributor drive gear. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b** Camshaft has SFO firing order, with 4/7 swap.
- c** Requires cam button spacer, camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- d** Ultra Pro Series vertical locking bar roller lifters.
- e** Ultra Pro Series vertical locking bar roller lifters for .904" diameter lifter bores.
- f** Must machine cylinder heads.
- g** For supercharged applications, use **99679-16** or **99678-16** retainers.
- h** Titanium for 3/8" dia. valve stems, must use **99098-1** valve stem locks, included with the retainers.
- i** Titanium for 11/32" dia. valve stems, must use **99097-1** valve stem locks, included with the retainers.
- j** For 3/8" dia. valve stems.
- k** For 11/32" dia. valve stems.
- l** Machined steel, heat treated for 3/8" dia. valve stems.
- m** Machined steel, heat treated, for 11/32" diameter valve stems, Multi Fit.
- n** Machined steel, heat treated for 11/32" dia. valve stems.
- o** Heavy wall, heat treated.
- p** Pro Series one-piece.
- q** Performance steel billet gears and roller chain set.
- r** Pro Series steel billet gears and roller chain set.
- s** Pro Series steel billet gears and roller chain set with thrust bearing.
- t** 1991-95 engines require the installation of **99157-16** 7/16" rocker arm studs and **13650-1** pushrod guideplates (machining required).
- u** 1.7 ratio, 7/16" stud. Valve Train Stabilizer available, see page 363.
- v** 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.
- w** Requires **99661-16** titanium retainers
- x** For 2.100" assembly height, requires **99663-16** titanium retainers.
- y** Titanium, for **961226-16** valve springs, requires Crane Multi Fit valve stem locks.
- z** Titanium, for **961356-16** valve springs, requires Crane Multi Fit valve stem locks.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| Competition only, strong mid range and top end for 572+ cu.in. Super Gas and Super Comp, good upper RPM HP, 540+ cu.in., drag racing, auto transmission w/race converter, 12.5 minimum compression ratio advised. Good w/large manifold nitrous system. Good w/large Roots supercharger, 30 lbs. maximum boost w/8.0 maximum compression ratio advised. | R-284/456-255-14                 | 5000-                 | 138391 <sup>a</sup>                        | 13570-16 <sup>c</sup>                          | 284  | 324   | 114                           | 31 73  | .026                        | .775                          |
|   | R-284/456-255-14 SFO             | 8400                  | 138401 <sup>a,b</sup>                      | 13574-16 <sup>d</sup>                          | 296  | 336   |                               | 85 31  | .026                        | .740                          |
| Competition only, 600+ cu.in., Top Sportsman, Quick 16, Top Dragster, auto transmission w/race converter, 13.0 minimum compression ratio advised.   | R-286/490-251-14 SFO             | 5000-<br>8000         | 138771 <sup>a,b</sup>                      | 13570-16 <sup>c</sup><br>13574-16 <sup>d</sup> | 286<br>306                                 | 326<br>352                                    | 114                           | 34 72<br>92 34                               | .026<br>.030                | .833<br>.810                  |
|   | R-286/500-253-16 SFO             | 5000-<br>7600         | 138951 <sup>a,b</sup>                      | 13570-16 <sup>c</sup><br>13574-16 <sup>d</sup> | 286<br>298                                 | 326<br>348                                    | 116                           | 30 76<br>89 29                               | .026<br>.030                | .850<br>.816                  |
| Radical competition only, good upper RPM HP, 640+ cu.in., bracket racing, Pro Street, auto trans w/race converter, intended for large manifold nitrous system, 14.5 minimum compression ratio advised.  | R-286/5151-25-16 SFO             | 6000-<br>8400         | 138961 <sup>a,b</sup>                      | 13570-16 <sup>c</sup><br>13574-16 <sup>d</sup> | 286<br>310                                 | 320<br>344                                    | 116                           | 31 75<br>94 36                               | .024<br>.026                | .876<br>.794                  |
|   | 321-334-10R                      | 5000-<br>8200         | 19315 <sup>a</sup>                         | 13570-16 <sup>c</sup><br>13574-16 <sup>d</sup> | 287<br>292                                 | 321<br>334                                    | 110                           | 37.5 69.5<br>80 32                           | .030<br>.030                | .723<br>.714                  |
| Competition only, maximum performance applications, 500+ cu.in., Super Comp, Super Quick, etc., stick or auto transmission w/race converter, 14.0 minimum compression ratio advised.  | 333-344-14R                      | 5000-<br>8400         | 19333 <sup>a</sup>                         | 13570-16 <sup>c</sup><br>13574-16 <sup>d</sup> | 287<br>297                                 | 333<br>344                                    | 114                           | 33.5 73.5<br>87.5 29.5                       | .035<br>.030                | .774<br>.726                  |
|   | R-288/5002-252-12 SFO            | 5000-<br>8400         | 138971 <sup>a,b</sup>                      | 13570-16 <sup>c</sup><br>13574-16 <sup>d</sup> | 288<br>300                                 | 318<br>332                                    | 112                           | 37 71<br>87 33                               | .020<br>.022                | .850<br>.850                  |
| Competition only, maximum performance applications, 560+ cu.in., Super Comp, Super Quick, etc., stick or auto transmission w/race converter, 14.0 minimum compression ratio advised.  | R-288/515-252-16 SFO             | 5000-<br>8400         | 138911 <sup>a,b</sup>                      | 13570-16 <sup>c</sup><br>13574-16 <sup>d</sup> | 288<br>312                                 | 322<br>352                                    | 116                           | 31 77<br>96 36                               | .024<br>.030                | .876<br>.800                  |
|   | R-288/515-253-18 SFO             | 5200-<br>8400         | 138921 <sup>a,b</sup>                      | 13570-16 <sup>c</sup><br>13574-16 <sup>d</sup> | 288<br>316                                 | 318<br>348                                    | 118                           | 30 78<br>100 36                              | .020<br>.022                | .876<br>.850                  |
| Competition only, IHRA Pro Stock, unlimited Street, very large cu.in. applications, also good w/large manifold nitrous systems, 14.5 minimum compression ratio advised.   | R-292/5152-25-17 SFO 55J         | 5800-<br>8600         | 138981 <sup>a,b</sup>                      | 13570-16 <sup>c</sup><br>13574-16 <sup>d</sup> | 292<br>310                                 | 322<br>342                                    | 117                           | 34 78<br>97 33                               | .020<br>.022                | .876<br>.850                  |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kits available. See page 333 for details.

**IMPORTANT NOTE:** 1991-95 Gen V engines can use these camshafts and components if they are converted to adjustable rocker arms by machining the cylinder heads for 99157-16 7/16" screw-in studs and 13650-1 pushrod guideplates, and installing appropriate rocker arms.

**NOTE:** Many options are available for these camshafts, and any of our custom ground camshafts. An iron distributor drive gear and rear journal can be specified. SFO firing order (4/7 swap) is offered. Optional journal sizes are: Roller Bearing (1.968"), 2.125" and 55mm (2.165"). Gun drilling (where applicable) is available. Camshafts for the GM DRCE family of V-8's are also offered in 55mm and 60mm journal versions.

**NOTE:** In order to use these cams in 65-66 engines, you must groove the center of the rear cam bearing journal, 3/16" wide and 7/64" deep.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                       | See pg. 350   | See pg. 362  | See pg. 360                                  | See pg. 306           | See pg. 328                                  | See pg. 312       | See pg. 315   | See pg. 317               |
|--------------------------------|---|---|--|--|-----------------------|--|-------------------|---|---------------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                     | RETAINERS   | VALVE STEM SEALS                                   | VALVE STEM LOCKS                             | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                 |
|                                | 96848-16 <sup>e</sup><br>961226-16 <sup>e,q</sup> | 99676-16 <sup>f</sup><br>99681-16 <sup>g</sup><br>99661-16 <sup>s</sup> | 99822-16 <sup>e,h</sup><br>99820-16 <sup>e,i</sup> | 99098-1 <sup>j</sup><br>99097-1 <sup>k</sup> | 13640-16 <sup>l</sup> | 13984-1 <sup>m</sup><br>13977-1 <sup>n</sup> |                   |   | 13763TR-16 <sup>o,p</sup> |
|                                | 96848-16 <sup>e</sup><br>961356-16 <sup>e,r</sup> | 99676-16 <sup>f</sup><br>99681-16 <sup>g</sup><br>99663-16 <sup>t</sup> | 99822-16 <sup>e,h</sup><br>99820-16 <sup>e,i</sup> | 99098-1 <sup>j</sup><br>99097-1 <sup>k</sup> | 13640-16 <sup>l</sup> | 13984-1 <sup>m</sup><br>13977-1 <sup>n</sup> |                   |   | 13763TR-16 <sup>o,p</sup> |
|                                | 96848-16 <sup>e</sup><br>961356-16 <sup>e,r</sup> | 99676-16 <sup>f</sup><br>99681-16 <sup>g</sup><br>99663-16 <sup>t</sup> | 99822-16 <sup>e,h</sup><br>99820-16 <sup>e,i</sup> | 99098-1 <sup>j</sup><br>99097-1 <sup>k</sup> | 13640-16 <sup>l</sup> | 13984-1 <sup>m</sup><br>13977-1 <sup>n</sup> |                   |   | 13763TR-16 <sup>o,p</sup> |
|                                | 96848-16 <sup>e</sup><br>961356-16 <sup>e,r</sup> | 99676-16 <sup>f</sup><br>99681-16 <sup>g</sup><br>99663-16 <sup>t</sup> | 99822-16 <sup>e,h</sup><br>99820-16 <sup>e,i</sup> | 99098-1 <sup>j</sup><br>99097-1 <sup>k</sup> | 13640-16 <sup>l</sup> | 13984-1 <sup>m</sup><br>13977-1 <sup>n</sup> |                   |   | 13763TR-16 <sup>o,p</sup> |
|                                | 96848-16 <sup>e</sup><br>961226-16 <sup>e,q</sup> | 99676-16 <sup>f</sup><br>99681-16 <sup>g</sup><br>99661-16 <sup>s</sup> | 99822-16 <sup>e,h</sup><br>99820-16 <sup>e,i</sup> | 99098-1 <sup>j</sup><br>99097-1 <sup>k</sup> | 13640-16 <sup>l</sup> | 13984-1 <sup>m</sup><br>13977-1 <sup>n</sup> |                   |   | 13763TR-16 <sup>o,p</sup> |
|                                | 96848-16 <sup>e</sup><br>961226-16 <sup>e,q</sup> | 99676-16 <sup>f</sup><br>99681-16 <sup>g</sup><br>99661-16 <sup>s</sup> | 99822-16 <sup>e,h</sup><br>99820-16 <sup>e,i</sup> | 99098-1 <sup>j</sup><br>99097-1 <sup>k</sup> | 13640-16 <sup>l</sup> | 13984-1 <sup>m</sup><br>13977-1 <sup>n</sup> |                   |   | 13763TR-16 <sup>o,p</sup> |
|                                | 96848-16 <sup>e</sup><br>961356-16 <sup>e,r</sup> | 99676-16 <sup>f</sup><br>99681-16 <sup>g</sup><br>99663-16 <sup>t</sup> | 99822-16 <sup>e,h</sup><br>99820-16 <sup>e,i</sup> | 99098-1 <sup>j</sup><br>99097-1 <sup>k</sup> | 13640-16 <sup>l</sup> | 13984-1 <sup>m</sup><br>13977-1 <sup>n</sup> |                   |   | 13763TR-16 <sup>o,p</sup> |
|                                | 96848-16 <sup>e</sup><br>961356-16 <sup>e,r</sup> | 99676-16 <sup>f</sup><br>99681-16 <sup>g</sup><br>99663-16 <sup>t</sup> | 99822-16 <sup>e,h</sup><br>99820-16 <sup>e,i</sup> | 99098-1 <sup>j</sup><br>99097-1 <sup>k</sup> | 13640-16 <sup>l</sup> | 13984-1 <sup>m</sup><br>13977-1 <sup>n</sup> |                   |   | 13763TR-16 <sup>o,p</sup> |
|                                | 96848-16 <sup>e</sup><br>961356-16 <sup>e,r</sup> | 99676-16 <sup>f</sup><br>99681-16 <sup>g</sup><br>99663-16 <sup>t</sup> | 99822-16 <sup>e,h</sup><br>99820-16 <sup>e,i</sup> | 99098-1 <sup>j</sup><br>99097-1 <sup>k</sup> | 13640-16 <sup>l</sup> | 13984-1 <sup>m</sup><br>13977-1 <sup>n</sup> |                   |   | 13763TR-16 <sup>o,p</sup> |
|                                | 96848-16 <sup>e</sup><br>961356-16 <sup>e,r</sup> | 99676-16 <sup>f</sup><br>99681-16 <sup>g</sup><br>99663-16 <sup>t</sup> | 99822-16 <sup>e,h</sup><br>99820-16 <sup>e,i</sup> | 99098-1 <sup>j</sup><br>99097-1 <sup>k</sup> | 13640-16 <sup>l</sup> | 13984-1 <sup>m</sup><br>13977-1 <sup>n</sup> |                   |   | 13763TR-16 <sup>o,p</sup> |

- a Requires cam button spacer and a **11990-1** (.489" I.D.) or **11989-1** (.500" I.D. Accel) aluminum-bronze distributor drive gear. For engines equipped with mechanical fuel pumps, fuel pump pushrod **11985-1** is highly recommended to prevent fuel pump lobe wear.
- b Camshaft has SFO firing order, with 4/7 swap.
- c Pro Series vertical locking bar roller lifters.
- d Ultra Pro Series vertical locking bar roller lifters for .904" diameter lifter bores.
- e Must machine cylinder heads.
- f Titanium for 3/8" dia. valve stems, must use **99098-1** valve stem locks, included with the retainers.
- g Titanium for 11/32" dia. valve stems, must use **99097-1** valve stem locks, included with the retainers.
- h For 3/8" dia. valve stems.
- i For 11/32" dia. valve stems.
- j Machined steel, heat treated for 3/8" dia. valve stems.
- k Machined steel, heat treated for 11/32" dia. valve stems.
- l Pro Series one-piece.
- m Pro Series steel billet gears and roller chain set.
- n Pro Series steel billet gears and roller chain set with thrust bearing.
- o 1991-95 engines require the installation of **99157-16** 7/16" rocker arm studs and **13650-1** pushrod guideplates (machining required).
- p 1.7 ratio, 7/16" stud, Wide Body. Valve Train Stabilizer available, see page 363.
- q Requires **99661-16** titanium retainers
- r For 2.100" assembly height, requires **99663-16** titanium retainers.
- s Titanium, for **961226-16** valve springs, requires Crane Multi Fit valve stem locks.
- t Titanium, for **961356-16** valve springs, requires Crane Multi Fit valve stem locks.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b><br>Brute low end torque and HP, smooth idle, daily usage, fuel efficiency, towing, 2000-2600 cruise RPM, 8.5 to 9.5 compression ratio advised. Good cam for Tuner.   | <b>HR-204/286-2-12 IG</b>        | 800-5000              | <b>168711<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 204  | 260   | 112                           | (5) 29                                       | .000                        | .486                          |
|  |                                  |                       |  |  | 214  | 270   |                               | 44 (10)                                      | .000                        | .512                          |
| Excellent low end & mid range torque and HP, good idle, daily usage, off road, towing, performance & fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised. Good cam for Tuner.  | <b>HR-214/325-2S-12 IG</b>       | 1200-5000             | <b>168721<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 214  | 276   | 112                           | 0 34   | .000                        | .553                          |
|  |                                  |                       |  |  | 220  | 282   |                               | 47 (7)                                       | .000                        | .564                          |
| Good low end and mid range torque and HP, good idle, moderate performance usage, auto trans w/2000+ converter, 2800-3200 cruise RPM, 9.0 to 10.75 compression ratio advised. Also mild marine performance w/performance exhaust.   | <b>HR-222/339-2S-12 IG</b>       | 1400-5400             | <b>168781<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 222  | 284   | 112                           | 4 38   | .000                        | .576                          |
|  |                                  |                       |  |  | 230  | 292   |                               | 52 (2)                                       | .000                        | .598                          |
| Excellent mid range torque and HP, fair idle, moderate performance usage, crate motor upgrade, mild bracket racing, auto trans w/2500+ converter, mild marine performance, mild supercharged, 3000-3400 cruise RPM, 9.5 to 11.0 compression ratio advised. Good cam for Tuner. | <b>HR-226/345-2S-12 IG</b>       | 1600-5600             | <b>168731<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 226  | 288   | 112                           | 6 40   | .000                        | .587                          |
|  |                                  |                       |  |  | 236  | 298   |                               | 55 1   | .000                        | .610                          |
| Excellent mid range torque and upper RPM HP, fair idle, moderate performance usage, crate motor upgrade, auto trans w/2800+ converter, mild supercharged, 3200-3600 cruise RPM, 9.75 to 11.25 compression ratio advised. Good cam for Tuner.                                   | <b>HR-226/345-2S-14 IG</b>       | 1800-5800             | <b>168791<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 226  | 288   | 114                           | 4 42   | .000                        | .587                          |
|  |                                  |                       |  |  | 236  | 298   |                               | 57 (1)                                       | .000                        | .610                          |
| Good mid range torque and HP, fair idle, moderate performance usage, crate motor upgrade, good mid range HP, mild bracket racing, auto trans w/2500+ converter, marine performance, mild supercharged, 3200-3600 cruise RPM, 10.0 to 11.5 compression ratio advised.           | <b>HR-230/352-2S-12 IG</b>       | 2000-5800             | <b>168761<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 230  | 292   | 112                           | 8 42   | .000                        | .598                          |
|  |                                  |                       |  |  | 236  | 298   |                               | 57 (1)                                       | .000                        | .610                          |
| Excellent mid range and upper RPM torque and HP, rough idle, performance usage, mild bracket racing w/ heavy car, auto trans w/3000+ converter, 3400-3800 cruise RPM, 10.0 to 11.25 compression ratio advised.   | <b>HR-236/359-2S-10 IG</b>       | 2200-5800             | <b>168801<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 236  | 298   | 110                           | 13 43  | .000                        | .610                          |
|  |                                  |                       |  |  | 244  | 306   |                               | 57 7   | .000                        | .632                          |
| Good mid range and upper RPM torque and HP, rough idle, performance usage, crate motor upgrade, mild bracket racing, auto trans w/3000+ converter, marine performance, 3400-3800 cruise RPM, 10.5 to 11.75 compression ratio advised.  | <b>HR-236/359-2S-12 IG</b>       | 2200-6000             | <b>168741<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 236  | 298   | 112                           | 11 45  | .000                        | .610                          |
|  |                                  |                       |  |  | 244  | 306   |                               | 59 5   | .000                        | .632                          |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel it is **HIGHLY RECOMMENDED** that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** The 1996-00 Gen VI engines can use these camshafts and components if they are converted to adjustable rocker arms by installing **99152-16** rocker arm studs (no machining required) and factory pushrod guideplates, providing open valve spring pressures do not exceed 480 pounds. Custom length pushrods can also be made to achieve correct lifter

preload if standard non-adjustable rocker arms are retained. See page 305 for special pushrod ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Left Hand rotation camshafts are available on special order. Contact Crane's Performance Consultants for details.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>                | <i>See pg. 350</i>                | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>   | <i>See pg. 328</i>             | <i>See pg. 312</i>       | <i>See pg. 315</i>                                  | <i>See pg. 317</i>                                   |
|--------------------------------|-----------------------------------|-----------------------------------|-----------------------|----------------------|--|--------------------------------|--------------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                     | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS   | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS        | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j,i</sup> | 16977-1 <sup>k</sup>           | 13801C-16 <sup>l,m</sup> | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j,i</sup> | 16977-1 <sup>k</sup>           | 13801C-16 <sup>l,m</sup> | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j,i</sup> | 16977-1 <sup>k</sup>           | 13801C-16 <sup>l,m</sup> | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j,i</sup> | 16977-1 <sup>k</sup>           | 13801C-16 <sup>l,m</sup> | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j,i</sup> | 16977-1 <sup>k</sup>           | 13801C-16 <sup>l,m</sup> | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j,i</sup> | 16977-1 <sup>k</sup>           | 13801C-16 <sup>l,m</sup> | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j,i</sup> | 16977-1 <sup>k</sup>           | 13801C-16 <sup>l,m</sup> | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j,i</sup> | 16977-1 <sup>k</sup>           | 13801C-16 <sup>l,m</sup> | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j,i</sup> | 16977-1 <sup>k</sup>           | 13801C-16 <sup>l,m</sup> | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |

Section Continued

- a Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required.
- b For use with standard GM alignment bars. Required for use with camshafts having greater than stock lobe lift.
- c Vertical locking bar hydraulic roller lifters, no machining required.
- d Ovate wire beehive spring, requires 99976-16 retainers.
- e Steel, for 99832-16 beehive springs.
- f Must machine cylinder heads.
- g Machined steel, heat treated.
- h Heavy wall, heat treated, for standard deck height blocks with adjustable rocker arms and hydraulic roller lifters.
- i Pro Series one piece.
- j Heavy wall, heat treated, for +.400" deck height "Tall Blocks" with adjustable rocker arms and hydraulic roller lifters.
- k Pro Series steel billet gears and roller chain set with thrust bearing.
- l 1.7 ratio, Nitro Carb, extra long slot for 1.560" maximum O.D. valve springs.
- m Gen VI cylinder heads require the installation of 99152-16 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
- n Crane Classic extruded, 1.7 ratio. Valve Train Stabilizer available, see page 363.
- o Energizer, 1.7 ratio. Valve Train Stabilizer available, see page 363.
- p 1.7 ratio. Valve Train Stabilizer available, see page 363.
- q 1.7 ratio Wide Body. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b><br>Good mid range & upper RPM HP, rough idle, performance usage, bracket racing, manifold nitrous system, auto trans w/3500+ converter, marine performance for 540+ engines, 3800-4200 cruise RPM, 10.5 to 12.5 compression ratio advised. Good w/supercharger 18 lbs. max. boost w/8.0 max. compression ratio advised.   | <b>HR-240/365-2S-14 IG</b>       | 2600-6200             | <b>168771<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 240  | 302   | 114                           | 11 49  | .000                        | .621                          |
|   |                                  |                       |  |  | 248  | 310   | 63 5                          | .000   | .632                        |                               |
| Good mid range to upper RPM torque, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, marine perf. w/aftermarket dry pipe exhaust systems or tube headers, 3600-4000 cruise RPM, best for 540+ cu.in. engines, 11.0 to 12.75 compression ratio advised.  | <b>HR-242/372-2S-12 IG</b>       | 2800-6200             | <b>168811<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 242  | 304   | 112                           | 14 48  | .000                        | .632                          |
|   |                                  |                       |  |  | 246  | 308   | 60 6                          | .000   | .632                        |                               |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, marine perf. for 540+ cu.in. modified engines in performance applications w/aftermarket dry pipe exhaust systems or tube headers. Good w/manifold nitrous system, 3800-4200 cruise RPM, best for 540+ cu.in. engines, 11.5 minimum compression ratio advised. Good w/Roots supercharger, 20 lbs. max. boost w/8.0 max. compression ratio advised. | <b>HR-244/372-2S2-14 IG</b>      | 3000-6400             | <b>169651<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 244  | 306   | 114                           | 13 51  | .000                        | .632                          |
|   |                                  |                       |  |  | 256  | 318   | 67 9                          | .000   | .632                        |                               |
| Excellent upper RPM torque and HP, performance usage, bracket racing, good w/manifold nitrous system, auto trans w/3500+ converter, best in 540+ cu.in. engines, 11.5 to 12.75 compression ratio advised. Good w/supercharger, 20 lbs. maximum boost, w/8.0 maximum compression ratio advised.  | <b>HR-248/372-2S-14 IG</b>       | 3200-6400             | <b>169691<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 248  | 310   | 114                           | 15 53  | .000                        | .632                          |
|   |                                  |                       |  |  | 256  | 318   | 67 9                          | .000   | .632                        |                               |
| Performance usage, good upper RPM torque and HP, bracket racing, Pro, Super Pro, etc., auto trans w/4000+ converter, best in 540+ cu.in., 12.5 minimum compression ratio advised.   | <b>HR-254/400-2S2-10 IG</b>      | 3400-6600             | <b>168831<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 254  | 324   | 110                           | 21.5 52.5                                    | .000                        | .680                          |
|   |                                  |                       |  |  | 262  | 332   | 66.5 16.5                     | .000   | .680                        |                               |
| Performance usage, good upper RPM torque and HP, bracket racing, good w/large manifold nitrous system, auto trans w/race converter, best in 540+ cu.in. engines w/prepared cylinder heads. 12.5 minimum compression ratio advised. Good w/large supercharger, 22 lbs. maximum boost w/8.5 maximum compression ratio advised.  | <b>HR-254/400-2S4-14 IG</b>      | 3600-6800             | <b>168841<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 254  | 324   | 114                           | 17.5 56.5                                    | .000                        | .680                          |
|   |                                  |                       |  |  | 262  | 332   | 69.5 12.5                     | .000   | .680                        |                               |
| Performance usage, good upper RPM torque and HP, bracket racing, Super Gas, Super Comp, auto trans w/race converter, best in 572+ cu.in. engines w/prepared cylinder heads, 12.5 minimum compression ratio advised.   | <b>HR-262/400-2S-14 IG</b>       | 3800-6800             | <b>168851<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 262  | 332   | 114                           | 21.5 60.5                                    | .000                        | .680                          |
|   |                                  |                       |  |  | 264  | 326   | 71 13                         | .000   | .680                        |                               |
| Performance usage, good upper RPM HP, bracket racing, Super Gas, Super Comp, auto trans w/4000+ converter, best in 572+ cu.in. engines w/prepared cylinder heads, good w/large manifold nitrous system, 12.5 min. compression ratio advised. Good w/large supercharger 26 lbs. max. boost w/8.5 max. compression ratio advised.   | <b>HR-262/400-2S1-14 IG</b>      | 3800-7000             | <b>169711<sup>a</sup></b>                  | <b>26535-16<sup>b</sup></b><br><b>13532-16<sup>c</sup></b> | 262  | 332   | 114                           | 21.5 60.5                                    | .000                        | .680                          |
|   |                                  |                       |  |  | 270  | 340   | 73.5 16.5                     | .000   | .680                        |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel it is **HIGHLY RECOMMENDED** that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** The 1996-00 Gen VI engines can use these camshafts and components if they are converted to adjustable rocker arms by installing **99152-16** rocker arm studs (no machining required) and factory pushrod guideplates, providing open valve spring pressures do not exceed 480 pounds. Custom length pushrods can also be made to achieve correct lifter preload if standard non-adjustable rocker arms are retained. See page 305 for special pushrod ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Left Hand rotation camshafts are available on special order. Contact Crane's Performance Consultants for details.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                       | See pg. 350                       | See pg. 362           | See pg. 360          | See pg. 306  | See pg. 328                    | See pg. 312       | See pg. 315   | See pg. 317  |
|--------------------------------|-----------------------------------|-----------------------------------|-----------------------|----------------------|--|--------------------------------|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                     | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS   | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j</sup> | 16977-1 <sup>k</sup>           |                   | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j</sup> | 16977-1 <sup>k</sup>           |                   | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j</sup> | 16977-1 <sup>k</sup>           |                   | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16<br>99832-16 <sup>d</sup> | 99955-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13628-16 <sup>h</sup><br>13642-16 <sup>h,i</sup><br>13629-16 <sup>j</sup><br>13643-16 <sup>j</sup> | 16977-1 <sup>k</sup>           |                   | 13774-16 <sup>m,n</sup><br>13744-16 <sup>m,o</sup>  | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16                          | 99955-16                          | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13642-16 <sup>h,i</sup><br>13643-16 <sup>j</sup>   | 16977-1 <sup>k</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16                          | 99955-16                          | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13642-16 <sup>h,i</sup><br>13643-16 <sup>j</sup>   | 16977-1 <sup>k</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16                          | 99955-16                          | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13642-16 <sup>h,i</sup><br>13643-16 <sup>j</sup>   | 16977-1 <sup>k</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |
|                                | 99896-16                          | 99955-16                          | 99822-16 <sup>f</sup> | 99098-1 <sup>g</sup> | 13642-16 <sup>h,i</sup><br>13643-16 <sup>j</sup>   | 16977-1 <sup>k</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>m,p</sup><br>13763TR-16 <sup>m,q</sup> |

- a Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required.
- b For use with standard GM alignment bars. Required for use with camshafts having greater than stock lobe lift.
- c Vertical locking bar hydraulic roller lifters, no machining required.
- d Ovale wire beehive spring, requires 99976-16 retainers.
- e Steel, for 99832-16 beehive springs.
- f Must machine cylinder heads.
- g Machined steel, heat treated.
- h Heavy wall, heat treated, for standard deck height blocks with adjustable rocker arms and hydraulic roller lifters.
- i Pro Series one piece.
- j Heavy wall, heat treated, for +.400" deck height "Tall Blocks" with adjustable rocker arms and hydraulic roller lifters.
- k Pro Series steel billet gears and roller chain set with thrust bearing.
- l 1.7 ratio, Nitro Carb, extra long slot for 1.560" maximum O.D. valve springs.
- m Gen VI cylinder heads require the installation of 99152-16 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
- n Crane Classic extruded, 1.7 ratio. Valve Train Stabilizer available, see page 363.
- o Energizer, 1.7 ratio. Valve Train Stabilizer available, see page 363.
- p 1.7 ratio. Valve Train Stabilizer available, see page 363.
- q 1.7 ratio Wide Body. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b>   |                                  |                       |  |  |  |   |                               |  |                             |                               |
| Excellent low end and mid range torque and HP, fair idle, moderate performance usage, marine performance, bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 10.5 to 11.5 compression ratio advised. Also mild supercharged, 10 lbs. maximum boost w/8.5 maximum compression ratio advised. | <b>SR-238/350-2S-12 IG</b>       | 2800-6600             | <b>168551<sup>a</sup></b>                  | <b>16510-16<sup>b</sup></b><br><b>13570-16<sup>c</sup></b> | 238<br>246                                 | 288<br>296                                    | 112                           | 12 46<br>60 6                                | .020<br>.020                | .595<br>.615                  |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, marine performance, bracket racing, auto trans w/3000+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised.   | <b>SR-246/362-2S-10 IG</b>       | 3000-6800             | <b>168601<sup>a</sup></b>                  | <b>16510-16<sup>b</sup></b><br><b>13570-16<sup>c</sup></b> | 246<br>254                                 | 296<br>304                                    | 110                           | 18 48<br>62 12                               | .020<br>.020                | .615<br>.636                  |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, marine performance, bracket racing, auto trans w/4000+ converter, 4200-4600 cruise RPM, 11.0 to 12.5 compression ratio advised.  | <b>SR-254/374-2S-12 IG</b>       | 3400-7200             | <b>168631<sup>a</sup></b>                  | <b>16510-16<sup>b</sup></b><br><b>13570-16<sup>c</sup></b> | 254<br>262                                 | 304<br>312                                    | 112                           | 19 55<br>67 15                               | .020<br>.020                | .636<br>.636                  |
| Performance usage, good low and mid range torque and HP, rough idle, bracket racing, auto trans w/3500+ converter, 11.0 to 12.5 compression ratio advised. Good w/manifold nitrous system. Also supercharged, 18 lbs. maximum boost w/ 8.0 maximum compression ratio advised.                                | <b>R-254/420-2S-12 IG</b>        | 3600-7200             | <b>168401<sup>a</sup></b>                  | <b>16510-16<sup>b</sup></b><br><b>13570-16<sup>c</sup></b> | 254<br>262                                 | 286<br>294                                    | 112                           | 19 55<br>67 15                               | .020<br>.020                | .714<br>.714                  |
| Performance usage, bracket racing, good mid to upper RPM Torque and HP, Pro, Super Pro, etc., auto trans w/race converter, 12.0 minimum compression ratio advised.   | <b>R-264/420-2S-10 IG</b>        | 4200-7400             | <b>168411<sup>a</sup></b>                  | <b>16510-16<sup>b</sup></b><br><b>13570-16<sup>c</sup></b> | 264<br>270                                 | 296<br>302                                    | 110                           | 26 58<br>69 21                               | .020<br>.020                | .714<br>.714                  |
| Competition only, bracket racing, good upper RPM Torque and HP, Super Pro, Super Gas, Super Comp, etc., auto trans w/race converter, 12.5 minimum compression ratio advised.   | <b>R-274/4334-2S-10 IG</b>       | 4600-8000             | <b>168291<sup>a</sup></b>                  | <b>16510-16<sup>b</sup></b><br><b>13570-16<sup>c</sup></b> | 274<br>284                                 | 314<br>324                                    | 110                           | 30 64<br>75 29                               | .026<br>.026                | .737<br>.726                  |
| Competition only, good upper RPM HP, 500+ cu.in., bracket racing, auto trans w/race converter, good w/large manifold nitrous system, 12.5 minimum compression ratio advised. Good w/large Roots supercharger, 24 lbs. maximum boost w/8.0 maximum compression ratio advised.                                 | <b>R-274/4334-2S-14 IG</b>       | 4800-8200             | <b>168351<sup>a</sup></b>                  | <b>16510-16<sup>b</sup></b><br><b>13570-16<sup>c</sup></b> | 274<br>284                                 | 314<br>324                                    | 114                           | 26 68<br>79 25                               | .026<br>.026                | .737<br>.726                  |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**NOTE:** The 1996-00 Gen VI engines can use these camshafts and components if they are converted to adjustable rocker arms by installing **99152-16** rocker arm studs (no machining required) and factory pushrod guideplates, providing open valve spring pressures do not exceed 480 pounds.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                    | See pg. 350  | See pg. 362           | See pg. 360          | See pg. 306   | See pg. 328                    | See pg. 312       | See pg. 315   | See pg. 317  |
|--------------------------------|--|--|-----------------------|----------------------|---|--------------------------------|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                  | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 99876-16 <sup>d</sup><br>99832-16 <sup>e</sup> | 99955-16<br>99676-16 <sup>f</sup><br>99976-16 <sup>g</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>h</sup> | 13634-16 <sup>i</sup><br>13640-16 <sup>j</sup><br>13635-16 <sup>k</sup> | 16977-1 <sup>l</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>o</sup><br>13763TR-16 <sup>m,p</sup> |
|                                | 99876-16 <sup>d</sup><br>99832-16 <sup>e</sup> | 99955-16<br>99676-16 <sup>f</sup><br>99976-16 <sup>g</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>h</sup> | 13634-16 <sup>i</sup><br>13640-16 <sup>j</sup><br>13635-16 <sup>k</sup> | 16977-1 <sup>l</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>o</sup><br>13763TR-16 <sup>m,p</sup> |
|                                | 99876-16 <sup>d</sup><br>99832-16 <sup>e</sup> | 99955-16<br>99676-16 <sup>f</sup><br>99976-16 <sup>g</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>h</sup> | 13634-16 <sup>i</sup><br>13640-16 <sup>j</sup><br>13635-16 <sup>k</sup> | 16977-1 <sup>l</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>o</sup><br>13763TR-16 <sup>m,p</sup> |
|                                | 96886-16 <sup>d</sup>                          | 99955-16<br>99676-16 <sup>f</sup>                          | 99822-16 <sup>d</sup> | 99098-1 <sup>h</sup> | 13634-16 <sup>i</sup><br>13640-16 <sup>j</sup><br>13635-16 <sup>k</sup> | 16977-1 <sup>l</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>o</sup><br>13763TR-16 <sup>m,p</sup> |
|                                | 96886-16 <sup>d</sup>                          | 99955-16<br>99676-16 <sup>f</sup>                          | 99822-16 <sup>d</sup> | 99098-1 <sup>h</sup> | 13634-16 <sup>i</sup><br>13640-16 <sup>j</sup><br>13635-16 <sup>k</sup> | 16977-1 <sup>l</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>o</sup><br>13763TR-16 <sup>m,p</sup> |
|                                | 96886-16 <sup>d</sup>                          | 99955-16<br>99676-16 <sup>f</sup>                          | 99822-16 <sup>d</sup> | 99098-1 <sup>h</sup> | 13634-16 <sup>i</sup><br>13640-16 <sup>j</sup><br>13635-16 <sup>k</sup> | 16977-1 <sup>l</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>o</sup><br>13763TR-16 <sup>m,p</sup> |
|                                | 96886-16 <sup>d</sup>                          | 99955-16<br>99676-16 <sup>f</sup>                          | 99822-16 <sup>d</sup> | 99098-1 <sup>h</sup> | 13634-16 <sup>i</sup><br>13640-16 <sup>j</sup><br>13635-16 <sup>k</sup> | 16977-1 <sup>l</sup>           |                   | 13774-16 <sup>m,n</sup>                             | 13750-16 <sup>o</sup><br>13763TR-16 <sup>m,p</sup> |

- a Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required.
- b For use with standard GM alignment bars.
- c Ultra Pro Series vertical locking bar roller lifters, no machining required.
- d Must machine cylinder heads.
- e Ovate wire beehive spring, requires 99976-16 retainers.
- f Titanium, must use 99098-1 valve stem locks, included with the retainers.
- g Steel, for 99832-16 beehive springs.
- h Machined steel, heat treated.
- i Heavy wall, heat treated.
- j Pro Series one piece.
- k Heavy wall, heat treated, for +.400" deck height "Tall Blocks".
- l Pro Series steel billet gears and roller chain set with thrust bearing.
- m Crane Classic extruded, 1.7 ratio. Valve Train Stabilizer available, see page 363.
- n Gen VI cylinder heads require the installation of 99152-16 7/16" rocker arm studs (no machining required) and factory pushrod guideplates. 480 pounds maximum valve spring pressure advised.
- o 1.7 ratio. Valve Train Stabilizer available, see page 363.
- p 1.7 ratio Wide Body. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code  | LIFTERS                     | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|---|-----------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b>   |                                  |                       |   |                             |  |   |                               |  |                             |                               |
| Brute low end torque, smooth idle, daily usage, fuel economy, towing, mild marine usage, 1600-2200 cruise RPM, 8.0 to 9.5 compression ratio advised.  | <b>HR-208/292-2S-16 IG</b>       | 800-4600              | <b>268701<sup>a</sup></b>   | <b>26535-16<sup>b</sup></b> | 208<br>214                                 | 264<br>270                                    | 116                           | (7) 35<br>48 (14)                            | .000<br>.000                | .496<br>.512                  |
|   |                                  |                       |    |                             |  |   |                               |  |                             |                               |
| Excellent low end torque and HP, good idle, daily usage, off road, towing, performance and fuel efficiency, computer upgrades may be required, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised. Marine performance usage with free flowing above water exhaust system. | <b>HR-216/325-2S-14 IG</b>       | 1200-5000             | <b>268711<sup>a</sup></b>   | <b>26535-16<sup>b</sup></b> | 214<br>220                                 | 276<br>241                                    | 114                           | (2) 36<br>49 (9)                             | .000<br>.000                | .553<br>.564                  |
|   |                                  |                       |    |                             |  |   |                               |  |                             |                               |
| Good mid range torque and HP, good idle, moderate performance usage, mild supercharged, computer upgrades required, 8.75 to 10.5 compression ratio advised. Marine performance usage with free flowing above water exhaust system.  | <b>HR-222/339-2S-12 IG</b>       | 1400-5400             | <b>268721<sup>a</sup></b>   | <b>26535-16<sup>b</sup></b> | 222<br>230                                 | 284<br>292                                    | 112                           | 4 38<br>52 (2)                               | .000<br>.000                | .576<br>.598                  |
|   |                                  |                       |    |                             |  |   |                               |  |                             |                               |
| Good mid range torque and HP, fair idle, moderate performance usage, mild supercharged, computer upgrades required, 9.0 to 11.0 compression ratio advised. Marine performance usage in modified engines with aftermarket high flow above water exhaust systems.                     | <b>HR-226/345-2S-14 IG</b>       | 1600-5600             | <b>268731<sup>a</sup></b>   | <b>26535-16<sup>b</sup></b> | 226<br>234                                 | 288<br>296                                    | 114                           | 4 42<br>56 (2)                               | .000<br>.000                | .587<br>.610                  |
|   |                                  |                       |    |                             |  |   |                               |  |                             |                               |
| Good mid range HP, fair idle, performance usage, computer upgrades required, 9.5 to 11.0 compression ratio advised. Marine performance usage w/ modified engines having aftermarket dry pipe exhaust systems.   | <b>HR-230/352-2S-14 IG</b>       | 1800-5800             | <b>268761<sup>a</sup></b>   | <b>26535-16<sup>b</sup></b> | 230<br>236                                 | 292<br>298                                    | 114                           | 6 44<br>57 (1)                               | .000<br>.000                | .598<br>.610                  |
|   |                                  |                       |  |                             |  |   |                               |  |                             |                               |
| Good mid range HP, rough idle, performance usage, mild supercharged, computer upgrades required, 10.0 to 11.5 compression ratio advised. Marine performance usage with modified engines having aftermarket dry pipe exhaust systems.  | <b>HR-236/359-2S1-14 IG</b>      | 2200-6000             | <b>268741<sup>a</sup></b>   | <b>26535-16<sup>b</sup></b> | 236<br>244                                 | 298<br>306                                    | 114                           | 9 47<br>61 3                                 | .000<br>.000                | .610<br>.632                  |
|   |                                  |                       |  |                             |  |   |                               |  |                             |                               |
| Good upper RPM HP, rough idle, performance usage for increased displacement engines, computer upgrades required, 10.0 to 11.0 compression ratio advised. Marine performance for highly modified engines with aftermarket dry pipe exhaust or tube headers.                          | <b>HR-240/365-2S-12 IG</b>       | 2600-6200             | <b>268771<sup>a</sup></b>   | <b>26535-16<sup>b</sup></b> | 240<br>248                                 | 302<br>310                                    | 112                           | 13 47<br>61 7                                | .000<br>.000                | .621<br>.632                  |
|   |                                  |                       |  |                             |  |   |                               |  |                             |                               |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT NOTE:** Crane Hydraulic Roller Cams offer tremendous power, torque and RPM potential. Due to their RPM capability and increased valve travel it is **HIGHLY RECOMMENDED** that the appropriate Crane valve train components be installed for maximum performance and reliability.

**NOTE:** For best performance and reliability, these engines should be converted to adjustable rocker arms by installing **99155-16** rocker arm studs (no machining required) and appropriate rocker arms. Custom length pushrods can also be made to achieve correct lifter preload if standard non-adjustable rocker arms are retained. See page 305 for special pushrod ordering instructions and page 374 for checking your hydraulic lifter preload.

Since 1975, General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                       | See pg. 350                       | See pg. 362           | See pg. 360          | See pg. 306           | See pg. 328                    | See pg. 312       | See pg. 315   | See pg. 317  |
|--------------------------------|-----------------------------------|-----------------------------------|-----------------------|----------------------|-----------------------|--------------------------------|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                     | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE  |
|                                | 99896-16<br>99832-16 <sup>c</sup> | 99964-16<br>99976-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 26640-16 <sup>g</sup> | 26977-1 <sup>h</sup>           |                   | 13774-16 <sup>i,j</sup><br>13744-16 <sup>i,k</sup>  | 13750-16 <sup>i,l</sup><br>13763TR-16 <sup>i,m</sup> |
|                                | 99896-16<br>99832-16 <sup>c</sup> | 99964-16<br>99976-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 26640-16 <sup>g</sup> | 26977-1 <sup>h</sup>           |                   | 13774-16 <sup>i,j</sup><br>13744-16 <sup>i,k</sup>  | 13750-16 <sup>i,l</sup><br>13763TR-16 <sup>i,m</sup> |
|                                | 99896-16<br>99832-16 <sup>c</sup> | 99964-16<br>99976-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 26640-16 <sup>g</sup> | 26977-1 <sup>h</sup>           |                   | 13774-16 <sup>i,j</sup><br>13744-16 <sup>i,k</sup>  | 13750-16 <sup>i,l</sup><br>13763TR-16 <sup>i,m</sup> |
|                                | 99896-16<br>99832-16 <sup>c</sup> | 99964-16<br>99976-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 26640-16 <sup>g</sup> | 26977-1 <sup>h</sup>           |                   | 13774-16 <sup>i,j</sup><br>13744-16 <sup>i,k</sup>  | 13750-16 <sup>i,l</sup><br>13763TR-16 <sup>i,m</sup> |
|                                | 99896-16<br>99832-16 <sup>c</sup> | 99964-16<br>99976-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 26640-16 <sup>g</sup> | 26977-1 <sup>h</sup>           |                   | 13774-16 <sup>i,j</sup><br>13744-16 <sup>i,k</sup>  | 13750-16 <sup>i,l</sup><br>13763TR-16 <sup>i,m</sup> |
|                                | 99896-16<br>99832-16 <sup>c</sup> | 99964-16<br>99976-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 26640-16 <sup>g</sup> | 26977-1 <sup>h</sup>           |                   | 13774-16 <sup>i,j</sup><br>13744-16 <sup>i,k</sup>  | 13750-16 <sup>i,l</sup><br>13763TR-16 <sup>i,m</sup> |
|                                | 99896-16<br>99832-16 <sup>c</sup> | 99964-16<br>99976-16 <sup>d</sup> | 99822-16 <sup>e</sup> | 99098-1 <sup>f</sup> | 26640-16 <sup>g</sup> | 26977-1 <sup>h</sup>           |                   | 13774-16 <sup>i,j</sup><br>13744-16 <sup>i,k</sup>  | 13750-16 <sup>i,l</sup><br>13763TR-16 <sup>i,m</sup> |

- a Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required.
- b For use with standard GM alignment bars. Required for use with camshafts having greater than stock lobe lift (.335").
- c Ovate wire beehive spring, requires 99976-16 retainers.
- d Steel, for 99832-16 beehive springs.
- e Must machine cylinder heads.
- f Machined steel, heat treated.
- g Pro Series one piece.
- h Pro Series steel billet gears and roller chain set with thrust bearing.
- i 8.1L cylinder heads require the installation of 99155-16 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
- j Crane Classic extruded, 1.7 ratio, 7/16" stud.
- k Energizer, 1.7 ratio, 7/16" stud.
- l 1.7 ratio, 7/16" stud.
- m 1.7 ratio Wide Body.

### COMPLETE CAM SPECIFICATIONS

See pg. 286

| Application   | Camshaft Series/<br>Grind Number                    | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code  | FOLLOWERS | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Valve Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|---|-----------------------|---|-----------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Follower Camshafts</b>  |   |                       |   |           |  |   |                               |  |                             |                               |
| Good idle, performance usage, good mid to upper RPM HP, street, drag race, OK with nitrous, aftermarket intake/exhaust advised.   | <b>CHR-242-2S-6</b>                                 | 1000-<br>6500         | <b>158-0010<sup>*</sup></b>   |           | 196<br>200                                 | 242<br>250                                    | 106                           | (11) 27<br>27 (7)                              | .000<br>.000                | .335<br>.315                  |
|   |   |                       |    |           |  |   |                               |  |                             |                               |
| Good idle, performance usage, for use with turbo, good upper RPM HP, intercooler advised, aftermarket intake/low restriction exhaust required.  | <b>CHR-250-2SR-8</b>                                | 1500-<br>6800         | <b>158-0012<sup>*</sup></b>   |           | 204<br>200                                 | 250<br>250                                    | 108                           | (9) 33<br>29 (9)                               | .000<br>.000                | .355<br>.315                  |
|   |   |                       |    |           |  |   |                               |  |                             |                               |
| Performance usage, primarily drag race, good upper RPM HP, good with turbo, intercooler advised, high flowing cylinder head/intake/large exhaust advised, aftermarket ECM required, 12.0+ minimum compression ratio required. | <b>CHR-262-2SR-8</b>                                | 2500-<br>7500         | <b>158-0014<sup>*</sup></b>   |           | 216<br>212                                 | 262<br>262                                    | 108                           | (3) 39<br>35 (3)                               | .000<br>.000                | .355<br>.345                  |
|   |   |                       |    |           |  |   |                               |  |                             |                               |
| Performance usage, drag race, good upper RPM HP, for use with turbo, intercooler advised, high flowing cylinder head/intake/large exhaust advised, aftermarket ECM required, 12.0+ minimum compression ratio required.        | <b>CHR-272-2S-14</b>                                | 3000-<br>7800         | <b>158-0016<sup>*</sup></b>   |           | 226<br>226                                 | 272<br>282                                    | 114                           | 1 45<br>52 (6)                                 | .000<br>.000                | .355<br>.345                  |
|   |   |                       |    |           |  |   |                               |  |                             |                               |
| Competition only, radical drag race, good upper RPM HP, turbo with intercooler, high flowing cylinder head/intake/large exhaust advised, aftermarket ECM required, 12.0+ minimum compression ratio required.                  | <b>CHR-232/400-2SR-10</b>                           | 3200-<br>8000         | <b>158-0018<sup>a</sup></b>   |           | 232<br>230                                 | 280<br>285                                    | 110                           | 7 45<br>50 0                                   | .000<br>.000                | .400<br>.400                  |
|   |   |                       |    |           |  |   |                               |  |                             |                               |
| Competition only, radical drag race, good high RPM HP, turbo with intercooler, high flowing cylinder head/intake/large exhaust advised, aftermarket ECM required, 12.0+ minimum compression ratio required.                   | <b>CHR-236/440-2SR-12</b>                           | 3500-<br>8500         | <b>158-0020<sup>a</sup></b>   |           | 236<br>230                                 | 280<br>285                                    | 112                           | 8 48<br>52 (2)                                 | .000<br>.000                | .440<br>.400                  |
|   |   |                       |  |           |  |   |                               |  |                             |                               |
|   | <b>Stock<br/>(For comparison<br/>purposes only)</b> |                       |   |           | 192<br>198                                 | 247<br>265                                    | 110                           |  | .000<br>.000                | .309<br>.275                  |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337            | See pg. 350            | See pg. 362      | See pg. 360      | See pg. 306 | See pg. 328                       | See pg. 312       | See pg. 315   | See pg. 317 |
|--------------------------------|------------------------|------------------------|------------------|------------------|-------------|-----------------------------------|-------------------|---|-------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS          | RETAINERS              | VALVE STEM SEALS | VALVE STEM LOCKS | PUSHRODS    | TIMING BELT AND SPROCKET ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
| 903-2003 <sup>b</sup>          | 158830-16 <sup>c</sup> | 158660-16 <sup>d</sup> |                  |                  |             |                                   |                   |   |             |
| 903-2003 <sup>b</sup>          | 158830-16 <sup>c</sup> | 158660-16 <sup>d</sup> |                  |                  |             |                                   |                   |   |             |
| 903-2003 <sup>b</sup>          | 158830-16 <sup>c</sup> | 158660-16 <sup>d</sup> |                  |                  |             |                                   |                   |   |             |
| 903-2003 <sup>b</sup>          | 158830-16 <sup>c</sup> | 158660-16 <sup>d</sup> |                  |                  |             |                                   |                   |   |             |
| 903-2003 <sup>b</sup>          | 158830-16 <sup>c</sup> | 158660-16 <sup>d</sup> |                  |                  |             |                                   |                   |   |             |
| 903-2003 <sup>b</sup>          | 158830-16 <sup>c</sup> | 158660-16 <sup>d</sup> |                  |                  |             |                                   |                   |   |             |

**Custom grinds available using the following lobes:**  
 Intake CHR-226/355 CHR-232/400\* CHR-236/440\*  
 Exhaust CHR-226/345 CHR-230/400\*  
 \* Requires Ferrea lash caps, part no. C10008

<sup>a</sup> Requires Ferrea lash caps, part no. C10008.  
<sup>b</sup> Includes valve springs and titanium retainers.  
<sup>c</sup> Requires 158660-16 retainers.  
<sup>d</sup> Titanium, for use with standard valve locks.

## COMPLETE CAM SPECIFICATIONS

See pg. 286

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | FOLLOWERS | Degrees<br>Duration<br>@ .050" | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050" | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------|--------------------------------|---|-------------------------------|-----------------------|---------------------|-------------------------------|
| Good idle, daily usage, good mid range HP, performance upgrade for stock engine, aftermarket intake/exhaust and ECM advised.   | CHR-242-6 <sup>a</sup>           | 1000-6500             | 180-0010 <sup>a</sup><br>Ⓔ                 |           | 200                            | 242   | 106                           | (3) 23                | .000                | .354                          |
|  | CHR-242-10 <sup>b</sup>          | 1000-6500             | 193-0010 <sup>b</sup><br>Ⓔ                 |           | 200                            | 242   | 110                           | (7) 27                | .000                | .354                          |
| Good idle, performance usage, for use with turbo, good upper RPM HP, intercooler advised, aftermarket intake/low restriction exhaust required.   | CHR-246-2SR-6 <sup>a</sup>       | 1500-6800             | 180-0014 <sup>a</sup><br>Ⓔ                 |           | 204                            | 246   | 106                           | 1 23                  | .000                | .364                          |
|  | CHR-246-2SR-10 <sup>b</sup>      | 1500-6800             | 193-0014 <sup>b</sup><br>Ⓔ                 |           | 204                            | 246   | 110                           | (3) 27                | .000                | .364                          |
| Good idle, performance usage, street, drag race, intended for use with nitrous, aftermarket intake/exhaust and ECM advised.  | CHR-246-8 <sup>a</sup>           | 1500-6800             | 180-0012 <sup>a</sup><br>Ⓔ                 |           | 204                            | 246   | 108                           | (3) 27                | .000                | .364                          |
|  | CHR-246-12 <sup>b</sup>          | 1500-6800             | 193-0012 <sup>b</sup><br>Ⓔ                 |           | 204                            | 246   | 112                           | (7) 31                | .000                | .364                          |
| Performance usage, drag race, turbocharger with intercooler, good upper RPM HP, high flowing cylinder head/intake/large exhaust advised, 11.0+ minimum compression ratio and aftermarket ECM required. | CHR-250-2SR-6 <sup>a</sup>       | 2200-7500             | 180-0015 <sup>a</sup><br>Ⓔ                 |           | 208                            | 250   | 106                           | (2) 30                | .000                | .374                          |
|  | CHR-250-2SR-6 <sup>b</sup>       | 2200-7500             | 193-0015 <sup>b</sup><br>Ⓔ                 |           | 208                            | 250   | 106                           | (2) 30                | .000                | .374                          |
| Fair idle, performance usage, drag race, good mid and upper RPM HP, high flowing cylinder head/intake/exhaust and aftermarket ECM advised.   | CHR-250-6 <sup>a</sup>           | 2000-7200             | 180-0016 <sup>a</sup><br>Ⓔ                 |           | 208                            | 250   | 106                           | 2 26                  | .000                | .374                          |
|  | CHR-250-10 <sup>b</sup>          | 2000-7200             | 193-0016 <sup>b</sup><br>Ⓔ                 |           | 208                            | 250   | 110                           | (2) 30                | .000                | .374                          |
| Performance usage, drag race, good upper RPM HP, high flowing cylinder head/intake/large exhaust advised, 12.0+ minimum compression ratio and aftermarket ECM required.                                | CHR-258-8 <sup>a</sup>           | 2500-7500             | 180-0018 <sup>a</sup><br>Ⓔ                 |           | 216                            | 258   | 108                           | 4 32                  | .000                | .394                          |
|  | CHR-258-12 <sup>b</sup>          | 2500-7500             | 193-0018 <sup>b</sup><br>Ⓔ                 |           | 216                            | 258   | 112                           | 0 36                  | .000                | .394                          |
| Competition only, drag race, good upper RPM HP, high flowing cylinder head/intake/large exhaust advised, 12.5+ minimum compression ratio and aftermarket ECM required.                                 | CHR-266-10 <sup>a</sup>          | 2800-7800             | 180-0020 <sup>a</sup><br>Ⓔ                 |           | 224                            | 266   | 110                           | 2 42                  | .000                | .413                          |
|  | CHR-266-10 <sup>b</sup>          | 2800-7800             | 193-0020 <sup>b</sup><br>Ⓔ                 |           | 224                            | 266   | 110                           | 2 42                  | .000                | .413                          |
| Competition only, drag race, good high RPM HP, high flowing cylinder head/intake/large exhaust advised, 13.0+ minimum compression ratio and aftermarket ECM required.                                  | CHR-274-10 <sup>a</sup>          | 3200-8000             | 180-0022 <sup>a</sup><br>Ⓔ                 |           | 232                            | 274   | 110                           | 6 46                  | .000                | .433                          |
|  | CHR-274-10 <sup>b</sup>          | 3200-8000             | 193-0022 <sup>b</sup><br>Ⓔ                 |           | 232                            | 274   | 110                           | 6 46                  | .000                | .433                          |
| Competition only, drag race, good high RPM HP, high flowing cylinder head/intake/large exhaust advised, 13.0+ minimum compression ratio and aftermarket ECM required.                                  | CHR-282-6 <sup>a</sup>           | 3600-8200             | 180-0024 <sup>a</sup><br>Ⓔ                 |           | 240                            | 282   | 106                           | 18 42                 | .000                | .453                          |
|  | CHR-282-6 <sup>b</sup>           | 3600-8200             | 193-0024 <sup>b</sup><br>Ⓔ                 |           | 240                            | 282   | 106                           | 18 42                 | .000                | .453                          |
| Competition only, radical drag race, high RPM HP, high flowing cylinder head/intake/large exhaust advised, 13.0+ minimum compression ratio and aftermarket ECM required.                               | CHR-290-6 <sup>a</sup>           | 4000-8600             | 180-0026 <sup>a</sup><br>Ⓔ                 |           | 248                            | 290   | 106                           | 22 46                 | .000                | .472                          |
|  | CHR-290-6 <sup>b</sup>           | 4000-8600             | 193-0026 <sup>b</sup><br>Ⓔ                 |           | 248                            | 290   | 106                           | 22 46                 | .000                | .472                          |
| Competition only, radical drag race, high RPM HP, high flowing cylinder head/intake/large exhaust advised, 13.5+ minimum compression ratio and aftermarket ECM required.                               | CHR-296-6 <sup>a</sup>           | 4400-8800             | 180-0028 <sup>a</sup><br>Ⓔ                 |           | 256                            | 296   | 106                           | 26 50                 | .000                | .492                          |
|  | CHR-296-6 <sup>b</sup>           | 4400-8800             | 193-0028 <sup>b</sup><br>Ⓔ                 |           | 256                            | 296   | 106                           | 26 50                 | .000                | .492                          |
| Stock<br>(For comparison purposes only)  |                                  |                       |  |           | 196                            | 243   | 108                           |                       | .000                | .344                          |
|  |                                  |                       |  |           | 196                            | 243   |                               |                       | .000                | .315                          |
| Stock<br>(For comparison purposes only)  |                                  |                       |  |           | 194                            | 248   | 113                           |                       | .000                | .325                          |
|  |                                  |                       |  |           | 196                            | 248   |                               |                       | .000                | .259                          |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

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**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>     | <i>See pg. 350</i>     | <i>See pg. 362</i> | <i>See pg. 360</i> | <i>See pg. 306</i> | <i>See pg. 328</i>                | <i>See pg. 312</i> | <i>See pg. 315</i>                                  | <i>See pg. 317</i> |
|--------------------------------|------------------------|------------------------|--------------------|--------------------|--------------------|-----------------------------------|--------------------|---|--------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS          | RETAINERS              | VALVE STEM SEALS   | VALVE STEM LOCKS   | PUSHRODS           | TIMING BELT AND SPROCKET ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE          |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |
| 903-2002 <sup>c</sup>          | 180830-16 <sup>d</sup> | 158660-16 <sup>e</sup> |                    |                    |                    |                                   |                    |   |                    |

Custom grinds available using the following lobes:  
 CHR-224/413      CHR-232/433      CHR-240/453  
 CHR-248/472      CHR-256/492      CHR-264/492  
 CHR-268/492

**a** For Neon 2.0 - 2.4L.  
**b** For SRT-4 and PT Cruiser 2.4L.  
**c** Includes valve springs and titanium retainers.  
**d** Requires 158660-16 retainers.  
**e** Titanium, for use with standard valve locks.

# Chrysler Small Block V8 Tech Tips & Notes

## 1957-1958 392 Hemi V8

Although not usually considered to be a Chrysler Small Block, these early Chrysler Hemi engines provided the basic architecture for the "A" and "LA" engines that followed. Although visually similar, the Dodge and DeSoto hemis (and the polyspherical variants) of the 1950's were unique engines that had little interchangeability with the Chrysler versions.

Our 53 prefix is for the 1951-1956 301-331-354 hemis, while the 54 prefix designates the 1957-1958 392 hemi. There is a lifter bore bank angle change between these two families, so be careful since these camshafts have the same basic dimensions. The cams can be physically interchanged, but performance would be poor, as valve timing would be incorrect from bank to bank. A 392 type timing chain set will also be required when installing these camshafts in the earlier 301-354 engines.

Retrofit hydraulic roller camshafts and drop in hydraulic roller lifters are offered, along with most valve train components. With the hydraulic roller applications, there may have to be some clearancing performed on the cylinder block and heads where the pushrods pass through, due to the taller lifters changing the pushrod angles, but modern camshaft technology can easily be applied to this half-century old powerplant.

Mechanical roller camshafts and drop in roller lifters for applications ranging from mild street to Nostalgia Top Fuel are also available, along with most valve train components. Whether you're using stock cast iron heads, or the latest billet aluminum pieces, we can supply the proper valve springs, retainers, and other parts to suit your needs.

## 1964-1987 273-340-360 (5.9L) & 1967-1986 318 "LA" V8

This engine family is commonly referred to as the Small Block Chrysler V8. Properly called the "LA" series, it is an evolution of the 1956-1966 "A" family, which included displacements of 277-301-303-318-326 cu.in. The A was noted for its Polyspherical combustion chamber/staggered valve cylinder heads (one rocker shaft per head, with the intake and exhaust rockers pointing in opposite directions), and mechanical lifters (except the 1959 Chrysler 326). The important part of this heritage is to help explain the unusual 59 degree lifter bore bank angle that carried over into the LA family. This was used in the A to provide the best compromise for lifter to pushrod angles for its inline lifter bore blocks. Also note there were 1964-1966 318 engines that were still the A version, and should not be confused with the 1967-1986 LA 318.

When upgrading to the LA (Lightweight A) family, Chrysler maintained the 59 degree lifter bore angle in the blocks, even though the valves were now inline, in a normally configured wedge chambered cylinder head. Shaft mounted 1.5:1 ratio rocker arms were employed. This resulted in an awkward appearing angle between the lifters and push-

rods. With the change in cylinder head configuration, a different valve layout was incorporated into the heads, however the basic camshaft dimensions were maintained. Therefore, while A and LA camshafts will physically interchange, half of the lobes will be in the wrong location, allowing only four cylinders to run properly. The 1964-1967 273 engines were equipped with mechanical lifter camshafts and adjustable rocker arms. Later engines had hydraulic lifters and non-adjustable rocker arms (with a couple of rare exceptions).

There were also left-hand rotation marine engines produced that required a unique camshaft. Make certain of the engine's rotation if you have a marine application.

Be aware of both OE production and factory replacement cylinder blocks that may incorporate very large chamfers on the tops of the lifter bores. This is not usually a problem when hydraulic and mechanical flat faced camshafts and lifters are used. In certain cases, if hydraulic and mechanical roller lifters are installed in these blocks, the oiling passages in the lifters may become exposed to the chamfer at full valve lift, causing a loss of oil pressure. Possible solutions would be sleeving the lifter bores, or having a camshaft custom ground having a reduced base circle diameter.

Crane Cams' 69 prefix has been assigned to the camshafts and components for this engine family, along with its factory produced variants. Principal among these are the R3 blocks that are available from Chrysler. These are offered in 59 degree and 48 degree lifter bank angle options (also, 45 and 47 degrees on the aluminum blocks), with the 59 degree R3 block not intended for roller lifter usage. There are also a number of choices of camshaft bearing journal sizes being used. These range from the standard stepped journals, plus: 50mm (1.968") - RB (first four journals) or 5RB (all five journals) suffix; 2.000" - BB suffix; 54mm (2.125") - 54J suffix; 60mm (2.362") - 60J suffix.

We offer cast hydraulic and mechanical lifter camshafts for the LA engines having the standard journal diameter, lifter bank angle, and firing order.

Steel billet retrofit hydraulic roller camshafts and components are available. The hydraulic roller lifters have a vertical locking bar, and are a drop-in configuration, with no machining required. These camshafts are produced from steel billet material, are heat treated, and then finish ground. They also incorporate a cast iron distributor drive gear and rear journal (IG suffix), allowing the use of a standard type distributor gear for long term reliability. Some early production and some later replacement and aftermarket cylinder heads may require modifications for pushrod clearance, due to their angle having changed resulting from the higher pushrod seats in the hydraulic roller lifters.

Steel billet mechanical roller camshafts are offered with Iron Gear versions for street performance and endurance racing, having standard diameter journals. Racing mechanical roller camshafts are available in standard firing order (1-8-4-3-6-5-7-2) and SFO (1-8-7-3-6-5-4-2) firing order. Mechanical roller camshafts are also available for the various camshaft journal diameters and lifter bore bank angles as previously mentioned.



**1986-1991 318 (5.2L) &  
1987-1991 360 (5.9L) "LA" V8**

These engines are a continuation of the LA series, being factory upgraded with hydraulic roller camshafts and lifters. Cylinder head changes were also made, with the valve spring envelope being reduced, making it very difficult to fit performance valve springs. Still designated with our 69 prefix, this engine group is listed separately to properly define the emissions legalities of the camshafts.

Hydraulic roller camshafts are offered, along with many valve train components.

**1992-2002 5.2L & 5.9L Magnum V8**

The final upgrade to the LA family, the Magnum engines received non-adjustable pedestal mounted 1.6:1 ratio rocker arms from the factory. The nose of the camshaft was also shortened as a result of vehicle packaging requirements, so there is no camshaft interchangeability with the earlier LA engines. Our 70 prefix indicates this version.

We offer hydraulic roller camshafts and many valve train components for the Magnum. Our **36655-16** Pushrod Guideplate and Rocker Arm Stud Conversion Kit can be used to install adjustable stud mounted rocker arms, with no cylinder head machining required.

**2002-2010 5.7L & 6.1L HEMI V8**

Chrysler's latest pushrod V8 capitalizes on the heritage of the legendary Chrysler Hemi powerplants of the 50's, 60's, and 70's. Loosely based around the LA engine's architecture, these are equipped with a hydraulic roller camshaft and .842" diameter hydraulic roller lifters. Crane Cams' 198 prefix denotes our products for these engines. Whenever upgrading to a performance camshaft, the cylinder deactivation system (MDS) lifters can not be used, and computer upgrades will be required. The 392 Crate engines are also included in this group.

We currently offer hydraulic roller camshafts, and other valve train components, with more products to be introduced.

**Dodge R5**

This is an evolution of the LA engine, designed for rules specific oval track racing. These engines were never installed in any vehicles, or sold as a complete assembly. Normally paired with the P7 cylinder heads, these are built per application for each form of competition. This is known as our 184 prefix, with 8620 steel billet roller cams having 60mm journals available on special order.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts—Retrofit</b>  |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Good low end and mid range and HP, good idle, daily and performance usage, auto trans w/2500+ converter, 2600-3400 cruise RPM, 8.75 to 10.5 compression ratio advised.  | HR-224/339-10                    | 2000-<br>6000         | 539521 <sup>a</sup>                        | 68532-16 <sup>c</sup> | 224  | 286   | 110                           | 7 37   | .000                        | .509                          |
|   |                                  |                       | 549521 <sup>b</sup>                        |                       | 224  |   |                               | 47 (3)                                       |                             |                               |
| Good mid to upper RPM torque and HP, fair idle, daily and performance usage, also mild supercharged, auto trans w/2500+ converter, 3200-4000 cruise RPM, 9.5 to 11.0 compression ratio advised, or 8.5 to 10.0 w/supercharger     | HR-230/352-2-14                  | 2600-<br>6600         | 539531 <sup>a</sup>                        | 68532-16 <sup>c</sup> | 230  | 292   | 114                           | 6 44   | .000                        | .528                          |
|   |                                  |                       | 549531 <sup>b</sup>                        |                       | 240  |   |                               | 302  |                             |                               |
| Good upper RPM torque and HP, rough idle, performance usage, auto trans w/3000+ converter, 4000-4800 cruise RPM, 11.0 to 12.5 compression ratio advised.  | HR-240/365-25-8                  | 3200-<br>6800         | 539541 <sup>a</sup>                        | 68532-16 <sup>c</sup> | 240  | 302   | 108                           | 17 43  | .000                        | .548                          |
|   |                                  |                       | 549541 <sup>b</sup>                        |                       | 248  |   |                               | 310  |                             |                               |
| <b>Mechanical Roller Camshafts</b>  |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Good low end and mid range torque, good idle, daily and performance usage, 2600-3400 cruise RPM, 8.75 to 9.75 compression ratio advised.  | SR-230/338-8                     | 2200-<br>6200         | 538491 <sup>a,e</sup>                      | 66515-16              | 230  | 280   | 108                           | 12 38  | .020                        | .507                          |
|   |                                  |                       | 548491 <sup>b,e</sup>                      |                       | 230  |   |                               | 280  |                             |                               |
| Good mid range RPM torque and HP, good idle, daily and performance usage, also mild supercharged, auto trans w/2000+ converter, 2800-3600 cruise RPM, 9.0 to 10.5 compression ratio advised, or 8.0 to 9.0 with supercharger.     | SR-230/338-25-10                 | 2200-<br>6200         | 538501 <sup>a,e</sup>                      | 66515-16              | 230  | 280   | 110                           | 10 40  | .020                        | .507                          |
|   |                                  |                       | 548501 <sup>b,e</sup>                      |                       | 238  |   |                               | 288  |                             |                               |
| Good mid to upper RPM torque and HP, fair idle, daily and performance usage, also mild supercharged, auto trans w/2500+ converter, 3200-4000 cruise RPM, 9.5 to 11.0 compression ratio advised, or 8.5 to 10.0 with supercharger. | SR-238/350-25-12                 | 2800-<br>6600         | 538511 <sup>a,e</sup>                      | 66515-16              | 238  | 288   | 112                           | 12 46  | .020                        | .525                          |
|   |                                  |                       | 548511 <sup>b,e</sup>                      |                       | 246  |   |                               | 296  |                             |                               |
| Good upper RPM torque and HP, rough idle, performance usage, also supercharged, auto trans w/3000+ converter, 3600-4400 cruise RPM, 10.0 to 11.5 compression ratio advised, or 8.5 to 10.5 with supercharger.                     | SR-246/362-12                    | 3200-<br>7000         | 538521 <sup>a,e</sup>                      | 66515-16              | 246  | 296   | 112                           | 16 50  | .020                        | .543                          |
|   |                                  |                       | 548521 <sup>b,e</sup>                      |                       | 246  |   |                               | 296  |                             |                               |
| Competition only, nostalgia A/F.  | R-278/458-10                     | 6000-<br>8600         | 538701 <sup>a,e</sup>                      | 66542-16 <sup>d</sup> | 278  | 310   | 110                           | 33 65  | .020                        | .687                          |
|   |                                  |                       | 548701 <sup>b,e</sup>                      |                       | 278  |   |                               | 310  |                             |                               |
| Competition only, baseline nostalgia T/F.   | R-284/456-10                     | 6000-<br>9900         | 538661 <sup>a,e</sup>                      | 66542-16 <sup>d</sup> | 284  | 324   | 110                           | 35 69  | .026                        | .684                          |
|   |                                  |                       | 548661 <sup>b,e</sup>                      |                       | 284  |   |                               | 324  |                             |                               |
| Competition only, cacklefest exhibition.  | R-285/410-8                      |                       | 538711 <sup>a,e</sup>                      | 66542-16 <sup>d</sup> | 285  | 328   | 108                           | 39.5 65.5                                    | .026                        | .615                          |
|   |                                  |                       | 548711 <sup>b,e</sup>                      |                       | 285  |   |                               | 328  |                             |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**NOTE:** Although the 1951-1956 301-331-354 camshafts have the basic same dimensions as the 1957-1958 392 camshafts, and are physically interchangeable, the lifter bore bank angle is different between these two groups. You must use the correct camshaft for your particular block to achieve proper performance.

**NOTE:** All camshafts are the short nose (1.100"), internally threaded (7/16"-14) configuration, requiring the 57-58 timing set.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                                    | See pg. 362  | See pg. 360                                      | See pg. 306 | See pg. 328                    | See pg. 312       | See pg. 315  | See pg. 320 |
|--------------------------------|-----------------------|--|--|--|-------------|--------------------------------|-------------------|--|-------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                                      | VALVE STEM SEALS                                   | VALVE STEM LOCKS                                 | PUSHRODS    | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER      GOLD RACE |             |
|                                | 99838-16 <sup>f</sup> | 99957-16 <sup>g</sup><br>99944-16 <sup>h</sup> | 99822-16 <sup>f,g</sup><br>99820-16 <sup>f,h</sup> | 99098-1 <sup>g,j</sup><br>99097-1 <sup>h,j</sup> |             | 69975-1 <sup>k</sup>           |                   |  |             |
|                                | 99838-16 <sup>f</sup> | 99957-16 <sup>g</sup><br>99944-16 <sup>h</sup> | 99822-16 <sup>f,g</sup><br>99820-16 <sup>f,h</sup> | 99098-1 <sup>g,j</sup><br>99097-1 <sup>h,j</sup> |             | 69975-1 <sup>k</sup>           |                   |  |             |
|                                | 99838-16 <sup>f</sup> | 99957-16 <sup>g</sup><br>99944-16 <sup>h</sup> | 99822-16 <sup>f,g</sup><br>99820-16 <sup>f,h</sup> | 99098-1 <sup>g,j</sup><br>99097-1 <sup>h,j</sup> |             | 69975-1 <sup>k</sup>           |                   |  |             |
|                                | 99893-16 <sup>f</sup> | 99954-16 <sup>g</sup><br>99953-16 <sup>h</sup> | 99822-16 <sup>f,g</sup><br>99820-16 <sup>f,h</sup> | 99098-1 <sup>g,j</sup><br>99097-1 <sup>h,j</sup> |             | 69975-1 <sup>k</sup>           |                   |  |             |
|                                | 99893-16 <sup>f</sup> | 99954-16 <sup>g</sup><br>99953-16 <sup>h</sup> | 99822-16 <sup>f,g</sup><br>99820-16 <sup>f,h</sup> | 99098-1 <sup>g,j</sup><br>99097-1 <sup>h,j</sup> |             | 69975-1 <sup>k</sup>           |                   |  |             |
|                                | 99893-16 <sup>f</sup> | 99954-16 <sup>g</sup><br>99953-16 <sup>h</sup> | 99822-16 <sup>f,g</sup><br>99820-16 <sup>f,h</sup> | 99098-1 <sup>g,j</sup><br>99097-1 <sup>h,j</sup> |             | 69975-1 <sup>k</sup>           |                   |  |             |
|                                | 99893-16 <sup>f</sup> | 99954-16 <sup>g</sup><br>99953-16 <sup>h</sup> | 99822-16 <sup>f,g</sup><br>99820-16 <sup>f,h</sup> | 99098-1 <sup>g,j</sup><br>99097-1 <sup>h,j</sup> |             | 69975-1 <sup>k</sup>           |                   |  |             |
|                                | 96884-16 <sup>f</sup> | 99675-16 <sup>i</sup>                          |  | 99097-1 <sup>h,j</sup>                           |             |                                |                   |  |             |
|                                | 96884-16 <sup>f</sup> | 99675-16 <sup>i</sup>                          |  | 99097-1 <sup>h,j</sup>                           |             |                                |                   |  |             |
|                                | 96884-16 <sup>f</sup> | 99675-16 <sup>i</sup>                          |  | 99097-1 <sup>h,j</sup>                           |             |                                |                   |  |             |

**a** For 1951-1956 301-331-354 cu.in.  
**b** For 1957-1958 392 cu.in.  
**c** Vertical locking bar hydraulic roller lifters. Due to the increased height of these lifters, the cylinder heads will require clearancing for the changed pushrod angles.  
**d** Ultra Pro series roller lifters.  
**e** Requires either 69990-1 aluminum bronze, or 69970-1 coated steel distributor gears.  
**f** Must machine cylinder heads.  
**g** For 3/8" valve stems.  
**h** For 11/32" valve stems.  
**i** Titanium, for 11/32" single groove valve stems, must use 99097-1 valve stem locks (included with the retainers).  
**j** Machined steel, heat treated, single groove.  
**k** Performance steel billet gears and roller chain set.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code   | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |  |  |   |                               |  |                             |                               |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.  | <b>H-248-2</b>                   | 800-4200              | <b>693971*</b>                               | <b>99278-16</b>                                | 192<br>204                                 | 248<br>260                                    | 112                           | (11) 23<br>39 (15)                           | .000<br>.000                | .400<br>.427                  |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Great low end torque and HP, smooth idle, daily usage, off road, towing, economy, mild marine performance, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.             | <b>H-260-2</b>                   | 1200-4800             | <b>693901*</b><br><b>693902<sup>2a</sup></b> | <b>99278-16</b>                                | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000                | .427<br>.454                  |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, good idle, daily usage, off road, towing, economy, mild marine performance, also mild turbocharged, 2400-2800 cruise RPM, 8.5 to 10.0 compression ratio advised. | <b>Z-268-2</b>                   | 1200-5000             | <b>693511*</b><br><b>693512*</b>             | <b>99278-16</b>                                | 212<br>220                                 | 268<br>276                                    | 112                           | (1) 33<br>47 (7)                             | .000<br>.000                | .459<br>.480                  |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Good low end to mid range torque, good idle, daily usage, off road, highway towing, fuel efficiency plus performance, 2600-3000 cruise RPM, 8.75 to 10.0 compression ratio advised.                        | <b>Energizer<br/>272 H10</b>     | 1800-5200             | <b>15005*</b><br><b>150052<sup>2a</sup></b>  | <b>99278-16</b>                                | 216<br>216                                 | 272<br>272                                    | 110                           | 3 23<br>43 (7)                               | .000<br>.000                | .454<br>.454                  |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, good idle, daily usage and off road, towing, performance and fuel efficiency, marine performance, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.  | <b>H-272-2</b>                   | 1800-5400             | <b>693941*</b><br><b>693942<sup>2a</sup></b> | <b>99278-16</b>                                | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000                | .454<br>.480                  |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, good idle, daily usage and off road, towing, performance and fuel efficiency, marine performance, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.  | <b>Z-276-2</b>                   | 1800-5600             | <b>693521*</b><br><b>693522<sup>2a</sup></b> | <b>99278-16</b>                                | 220<br>228                                 | 276<br>284                                    | 110                           | 5 35<br>49 (1)                               | .000<br>.000                | .480<br>.501                  |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Excellent mid range torque, rough idle, moderate performance usage, limited oval track, mild bracket racing, auto trans w/3000+ converter, serious off road, 9.5 to 11.0 compression ratio advised.        | <b>H-222/3200-6</b>              | 2200-5600             | <b>690141*</b>                               | <b>99278-16</b><br><b>99378-16<sup>b</sup></b> | 222<br>222                                 | 294<br>294                                    | 106                           | 9 33<br>41 1                                 | .000<br>.000                | .480<br>.480                  |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Good mid range torque and HP, fair idle, daily performance usage, mild bracket racing, mild supercharged, small nitrous system, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.              | <b>H-278-2</b>                   | 2200-5800             | <b>693801*</b><br><b>693802<sup>2a</sup></b> | <b>99278-16</b><br><b>99378-16<sup>b</sup></b> | 222<br>234                                 | 278<br>290                                    | 114                           | 2 40<br>56 (2)                               | .000<br>.000                | .467<br>.494                  |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                             |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**NOTE:** For maximum performance, and to provide the most accurate valve adjustment on hydraulic lifter camshafts, the use of our **69770-16** adjustable rocker arms and **69691-16** pushrods is highly recommended.

**NOTE:** Early 1986-91 318 (5.2L) and early 1987-91 360 (5.9L) engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller camshafts and lifters can be installed in these engines, providing the appropriate kit components are used.

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**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>    | <i>See pg. 350</i> | <i>See pg. 362</i>    | <i>See pg. 360</i> | <i>See pg. 306</i>    | <i>See pg. 328</i>             | <i>See pg. 312</i>                             | <i>See pg. 315</i>   | <i>See pg. 320</i> |
|--------------------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------------------|--|--|--------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS          | VALVE STEM SEALS      | VALVE STEM LOCKS   | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | CAST ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/ ENERGIZER GOLD RACE |                    |
| 69308-1 <sup>c</sup>           | 99835-16 <sup>c</sup> | 99948-16           |                       |                    | 69621-16 <sup>e</sup> | 69975-1 <sup>f</sup>           | 69770-16 <sup>g</sup><br>69771-16 <sup>h</sup> | 69790-1 <sup>i</sup><br>69791-1 <sup>j</sup>               |                    |
| 69308-1 <sup>c</sup>           | 99835-16 <sup>c</sup> | 99948-16           |                       |                    | 69621-16 <sup>e</sup> | 69975-1 <sup>f</sup>           | 69770-16 <sup>g</sup><br>69771-16 <sup>h</sup> | 69790-1 <sup>i</sup><br>69791-1 <sup>j</sup>               |                    |
| 69308-1 <sup>c</sup>           | 99835-16 <sup>c</sup> | 99948-16           |                       |                    | 69621-16 <sup>e</sup> | 69975-1 <sup>f</sup>           | 69770-16 <sup>g</sup><br>69771-16 <sup>h</sup> | 69790-1 <sup>i</sup><br>69791-1 <sup>j</sup>               |                    |
| 69308-1 <sup>c</sup>           | 99835-16 <sup>c</sup> | 99948-16           |                       |                    | 69621-16 <sup>e</sup> | 69975-1 <sup>f</sup>           | 69770-16 <sup>g</sup><br>69771-16 <sup>h</sup> | 69790-1 <sup>i</sup><br>69791-1 <sup>j</sup>               |                    |
| 69308-1 <sup>c</sup>           | 99835-16 <sup>c</sup> | 99948-16           |                       |                    | 69621-16 <sup>e</sup> | 69975-1 <sup>f</sup>           | 69770-16 <sup>g</sup><br>69771-16 <sup>h</sup> | 69790-1 <sup>i</sup><br>69791-1 <sup>j</sup>               |                    |
| 69308-1 <sup>c</sup>           | 99835-16 <sup>c</sup> | 99948-16           |                       |                    | 69621-16 <sup>e</sup> | 69975-1 <sup>f</sup>           | 69770-16 <sup>g</sup><br>69771-16 <sup>h</sup> | 69790-1 <sup>i</sup><br>69791-1 <sup>j</sup>               |                    |
| 69308-1 <sup>c</sup>           | 99835-16 <sup>c</sup> | 99948-16           | 99822-16 <sup>d</sup> |                    | 69621-16 <sup>e</sup> | 69975-1 <sup>f</sup>           | 69770-16 <sup>g</sup><br>69771-16 <sup>h</sup> | 69790-1 <sup>i</sup><br>69791-1 <sup>j</sup>               |                    |
| 69308-1 <sup>c</sup>           | 99835-16 <sup>c</sup> | 99948-16           |                       |                    | 69621-16 <sup>e</sup> | 69975-1 <sup>f</sup>           | 69770-16 <sup>g</sup><br>69771-16 <sup>h</sup> | 69790-1 <sup>i</sup><br>69791-1 <sup>j</sup>               |                    |

**Section Continued**

- a Cam and lifter kit, includes installation lubricants.
- b Optional Hi Intensity hydraulic lifters, see page 292 for details.
- c Contains standard diameter valve springs, no machining required.
- d Must machine cylinder heads.
- e Heavy wall, heat treated, for use with adjustable rocker arms.
- f Performance steel billet gears and roller chain set.
- g 1.5 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- h 1.6 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- i 1.5 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.
- j 1.6 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts — Retrofit</b>   |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Excellent low end torque and HP, smooth idle, daily usage, towing, economy, also mild turbocharged, 2200-3000 cruise RPM, 8.0 to 9.5 compression ratio advised.  | HR-204/286-2-12 IG               | 800-4800              | 699601 <sup>a</sup>                        | 69532-16 <sup>b</sup> | 204<br>214                                 | 260<br>270                                    | 112                           | (5) 44<br>29 (10)                            | .000<br>.000                | .429<br>.452                  |
| Good low end torque and HP, good idle, daily usage, off road, performance and fuel efficiency, also mild turbocharged, 2600-3400 cruise RPM, 8.75 to 10.5 compression ratio advised.                               | HR-214/325-2S-12 IG              | 1400-5400             | 699611 <sup>a</sup>                        | 69532-16 <sup>b</sup> | 214<br>222                                 | 276<br>284                                    | 112                           | 0 34<br>48 (6)                               | .000<br>.000                | .488<br>.509                  |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3000-3800 cruise RPM, 9.5 to 10.75 compression ratio advised.                  | HR-222/339-2S-12 IG              | 2000-6000             | 699621 <sup>a</sup>                        | 69532-16 <sup>b</sup> | 222<br>230                                 | 284<br>292                                    | 112                           | 4 38<br>52 (2)                               | .000<br>.000                | .509<br>.528                  |
| Good mid range torque and HP, fair idle, moderate performance usage, bracket racing w/heavy car, auto trans w/2500+ converter, serious off road, 3200-4000 cruise RPM, 10.0 to 11.5 compression ratio advised.     | HR-226/345-2S1-10 IG             | 2000-6000             | 699651 <sup>a</sup>                        | 69532-16 <sup>b</sup> | 226<br>230                                 | 288<br>292                                    | 110                           | 8 38<br>50 0                                 | .000<br>.000                | .518<br>.528                  |
| Good mid to upper RPM torque and HP, fair idle, performance usage, 3600-4400 cruise RPM, good w/manifold nitrous system, 10.0 to 11.5 compression ratio advised.   | HR-230/352-2S-12 IG              | 2600-6600             | 699631 <sup>a</sup>                        | 69532-16 <sup>b</sup> | 230<br>238                                 | 292<br>300                                    | 112                           | 8 42<br>56 10                                | .000<br>.000                | .528<br>.548                  |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 360+ cu.in., 4000-4800 cruise RPM, 10.5 to 12.0 compression ratio advised.                 | HR-238/365-2S-8 IG               | 2800-6800             | 699661 <sup>a</sup>                        | 69532-16 <sup>b</sup> | 238<br>246                                 | 300<br>308                                    | 108                           | 16 42<br>56 10                               | .000<br>.000                | .548<br>.558                  |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, mild bracket racing, auto trans w/3500+ converter, 4200-4800 cruise RPM, 10.5 to 12.0 compression ratio advised, also mild supercharged. | HR-238/365-2S-14 IG              | 3000-7000             | 699641 <sup>a</sup>                        | 69532-16 <sup>b</sup> | 238<br>246                                 | 300<br>308                                    | 114                           | 10 48<br>62 4                                | .000<br>.000                | .548<br>.558                  |
| Rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 4000-4800 cruise RPM, 360+ cu.in., 11.0 to 12.5 compression ratio advised.  | HR-242/372-2-8 IG                | 3200-7000             | 699671 <sup>a</sup>                        | 69532-16 <sup>b</sup> | 242<br>252                                 | 304<br>314                                    | 108                           | 18 44<br>59 13                               | .000<br>.000                | .558<br>.558                  |
| Performance usage, bracket racing w/ heavy car, auto trans w/4000+ converter, 380+ cu.in., 11.5 to 13.0 compression ratio advised.   | HR-246/372-2S-8 IG               | 3400-7000             | 699681 <sup>a</sup>                        | 69532-16 <sup>b</sup> | 246<br>254                                 | 308<br>316                                    | 108                           | 20 46<br>60 14                               | .000<br>.000                | .558<br>.558                  |
| Performance usage, good upper RPM HP, bracket racing, good w/manifold nitrous system, auto trans w/4000+ converter, 380+ cu.in., 13.0 minimum compression ratio advised, also mild supercharged.                   | HR-252/372-2S-10 IG              | 4000-7200             | 699691 <sup>a</sup>                        | 69532-16 <sup>b</sup> | 252<br>262                                 | 314<br>324                                    | 110                           | 21 51<br>66 16                               | .000<br>.000                | .558<br>.558                  |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**  
**IMPORTANT:** Due to the increased pushrod seat height of the Crane retrofit hydraulic roller lifters, some early cylinder heads, and some aftermarket cylinder heads, may have to be modified for pushrod clearance.

**NOTE:** For maximum performance, and to provide the most accurate valve adjustment on hydraulic roller camshafts, the use of our 69770-16 or 69790-1 adjustable rocker arms and 69628-16 pushrods is highly recommended. Otherwise, special length pushrods will be required. See page 305 for special pushrod ordering instructions.

**NOTE:** Early 1986-91 318 (5.2L) and early 1987-91 360 (5.9L) engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller camshafts and lifters can be installed in these engines, providing the appropriate kit components are used.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360      | See pg. 306           | See pg. 328                    | See pg. 312                                    | See pg. 315  | See pg. 320                                  |
|--------------------------------|-----------------------|-------------|-----------------------|------------------|-----------------------|--------------------------------|--|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | CAST ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/ ENERGIZER GOLD RACE |  |
|                                | 99838-16 <sup>c</sup> | 99948-16    | 99822-16 <sup>c</sup> |                  | 69628-16 <sup>d</sup> | 69975-1 <sup>e</sup>           | 69770-16 <sup>f</sup><br>69771-16 <sup>g</sup> |  | 69790-1 <sup>h</sup><br>69791-1 <sup>i</sup> |
|                                | 99838-16 <sup>c</sup> | 99948-16    | 99822-16 <sup>c</sup> |                  | 69628-16 <sup>d</sup> | 69975-1 <sup>e</sup>           | 69770-16 <sup>f</sup><br>69771-16 <sup>g</sup> |  | 69790-1 <sup>h</sup><br>69791-1 <sup>i</sup> |
|                                | 99838-16 <sup>c</sup> | 99948-16    | 99822-16 <sup>c</sup> |                  | 69628-16 <sup>d</sup> | 69975-1 <sup>e</sup>           | 69770-16 <sup>f</sup><br>69771-16 <sup>g</sup> |  | 69790-1 <sup>h</sup><br>69791-1 <sup>i</sup> |
|                                | 99838-16 <sup>c</sup> | 99948-16    | 99822-16 <sup>c</sup> |                  | 69628-16 <sup>d</sup> | 69975-1 <sup>e</sup>           | 69770-16 <sup>f</sup><br>69771-16 <sup>g</sup> |  | 69790-1 <sup>h</sup><br>69791-1 <sup>i</sup> |
|                                | 99838-16 <sup>c</sup> | 99948-16    | 99822-16 <sup>c</sup> |                  | 69628-16 <sup>d</sup> | 69975-1 <sup>e</sup>           | 69770-16 <sup>f</sup><br>69771-16 <sup>g</sup> |  | 69790-1 <sup>h</sup><br>69791-1 <sup>i</sup> |
|                                | 96874-16 <sup>c</sup> | 99957-16    | 99822-16 <sup>c</sup> |                  | 69628-16 <sup>d</sup> | 69975-1 <sup>e</sup>           | 69770-16 <sup>f</sup><br>69771-16 <sup>g</sup> |  | 69790-1 <sup>h</sup><br>69791-1 <sup>i</sup> |
|                                | 96874-16 <sup>c</sup> | 99957-16    | 99822-16 <sup>c</sup> |                  | 69628-16 <sup>d</sup> | 69975-1 <sup>e</sup>           | 69770-16 <sup>f</sup><br>69771-16 <sup>g</sup> |  | 69790-1 <sup>h</sup><br>69791-1 <sup>i</sup> |
|                                | 96874-16 <sup>c</sup> | 99957-16    | 99822-16 <sup>c</sup> |                  | 69628-16 <sup>d</sup> | 69975-1 <sup>e</sup>           | 69770-16 <sup>f</sup><br>69771-16 <sup>g</sup> |  | 69790-1 <sup>h</sup><br>69791-1 <sup>i</sup> |
|                                | 96874-16 <sup>c</sup> | 99957-16    | 99822-16 <sup>c</sup> |                  | 69628-16 <sup>d</sup> | 69975-1 <sup>e</sup>           | 69770-16 <sup>f</sup><br>69771-16 <sup>g</sup> |  | 69790-1 <sup>h</sup><br>69791-1 <sup>i</sup> |
|                                | 96874-16 <sup>c</sup> | 99957-16    | 99822-16 <sup>c</sup> |                  | 69628-16 <sup>d</sup> | 69975-1 <sup>e</sup>           | 69770-16 <sup>f</sup><br>69771-16 <sup>g</sup> |  | 69790-1 <sup>h</sup><br>69791-1 <sup>i</sup> |

- a** Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required.
- b** Vertical locking bar hydraulic roller lifters, no machining required. Special length pushrods are required, use **69628-16** with adjustable rocker arms.
- c** Must machine cylinder heads.
- d** Heavy wall, heat treated, for use with adjustable rocker arms.
- e** Performance steel billet gears and roller chain set.
- f** 1.5 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- g** 1.6 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- h** 1.5 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.
- i** 1.6 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|----------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Lifter Camshafts</b>   |                                  |                       |  |          |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, bracket racing, 3400-3800 cruise RPM, 10.0 to 11.5 compression ratio advised.   | F-238/3200-2-14                  | 2600-6400             | 691191*                                    | 99260-16 | 238  | 300   | 114                           | 10 48  | .022                        | .480                          |
|  |                                  |                       |  |          | 248  | 310   | 63 5                          | .022   | .500                        |                               |
| Good mid range torque, performance usage, limited oval track 1/4-3/8 mile, bracket racing w/heavy car, serious off road, auto trans w/2500+ converter, 10.5 to 12.0 compression ratio advised.                                 | F-244/3454-2S-6                  | 3200-6800             | 690921*                                    | 99260-16 | 244  | 280   | 106                           | 19 45  | .026                        | .518                          |
|  |                                  |                       |  |          | 252  | 288   | 55 17                         | .026   | .536                        |                               |
| Good mid range torque and HP, rough idle, performance usage, limited oval track, bracket racing, serious off road, auto trans w/2000+ converter, 10.5 to 12.0 compression ratio advised.                                       | F-248/3602-2-8                   | 3200-7000             | 690911*                                    | 99260-16 | 248  | 284   | 108                           | 21 47  | .026                        | .540                          |
|  |                                  |                       |  |          | 258  | 294   | 62 16                         | .026   | .560                        |                               |
| Performance usage, great mid range torque and HP, bracket racing, 340+ cu.in., auto trans w/2500+ converter, 11.0 to 12.5 compression ratio advised.   | F-256/383-2S-8                   | 3600-7400             | 690931*                                    | 99260-16 | 256  | 312   | 108                           | 25 51  | .014                        | .575                          |
|  |                                  |                       |  |          | 260  | 316   | 63 17                         | .016   | .585                        |                               |
| Good mid range and upper RPM torque and HP, rough idle, performance usage, bracket racing, 340+ cu.in., auto trans w/2500+ converter, 11.0 to 12.5 compression ratio advised.  | F-258/3735-2-8                   | 3600-7200             | 691381*                                    | 99260-16 | 258  | 294   | 108                           | 26 52  | .026                        | .560                          |
|  |                                  |                       |  |          | 268  | 304   | 67 21                         | .026   | .580                        |                               |
| Good upper RPM torque and HP, moderate competition only, bracket racing, 360+ cu.in., auto trans w/3000+ converter, good w/ plate nitrous system, aluminum cylinder heads recommended, 12.0 minimum compression ratio advised. | F-262/394-2S-10                  | 3800-7600             | 691391*                                    | 99260-16 | 262  | 294   | 110                           | 26 56  | .018                        | .591                          |
|  |                                  |                       |  |          | 264  | 296   | 67 17                         | .018   | .596                        |                               |
| Good upper RPM torque and HP, moderate competition only, bracket racing, 360+ cu.in., auto trans w/3000+ converter, 12.0 minimum compression ratio advised.  | F-268/3868-2-8                   | 4000-7600             | 691561*                                    | 99260-16 | 268  | 304   | 108                           | 31 57  | .026                        | .580                          |
|  |                                  |                       |  |          | 278  | 314   | 72 26                         | .026   | .600                        |                               |
| Competition only, good upper RPM torque and HP, auto trans w/3500+ converter, good with manifold nitrous system, 360+ cu.in., 12.5 minimum compression ratio advised.  | F-274/412-2S-8                   | 4200-8000             | 691571*                                    | 99260-16 | 274  | 306   | 108                           | 34 60  | .018                        | .618                          |
|  |                                  |                       |  |          | 288  | 324   | 75 33                         | .026   | .620                        |                               |
| Competition only, good upper RPM HP, auto trans w/3500+ converter, 360+ cu.in., 12.5 minimum compression ratio advised.  | F-278/4002-8                     | 4400-8000             | 691701*                                    | 99260-16 | 278  | 314   | 108                           | 36 62  | .026                        | .600                          |
|  |                                  |                       |  |          | 278  | 314   | 72 26                         | .026   | .600                        |                               |
| Radical competition only, maximum performance applications, flat tappet restricted classes, aluminum cylinder heads advised, 13.5 minimum compression ratio advised.   | F-288/4134-8                     | 5000-8400             | 691951*                                    | 99260-16 | 288  | 324   | 108                           | 41 67  | .026                        | .620                          |
|  |                                  |                       |  |          | 288  | 324   | 77 31                         | .026   | .620                        |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

NOTE: To effect valve adjustment, 318, 340 and 360 engines require the use of Crane Adjustable Rocker Arms and appropriate pushrods when using mechanical lifter cams.

NOTE: Early 1986-91 318 (5.2L) and early 1987-91 360 (5.9L) engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller camshafts and lifters can be installed in these engines, providing the appropriate kit components are used.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360      | See pg. 306           | See pg. 328                    | See pg. 312                                    | See pg. 315   | See pg. 320                                  |
|--------------------------------|-----------------------|-------------|-----------------------|------------------|-----------------------|--------------------------------|--|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | CAST ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/ENERGIZER GOLD RACE |  |
|                                | 99838-16 <sup>a</sup> | 99948-16    | 99822-16 <sup>a</sup> |                  | 69622-16 <sup>b</sup> | 69975-1 <sup>c</sup>           | 69770-16 <sup>d</sup><br>69771-16 <sup>e</sup> |   | 69790-1 <sup>f</sup><br>69791-1 <sup>g</sup> |
|                                | 99838-16 <sup>a</sup> | 99948-16    | 99822-16 <sup>a</sup> |                  | 69622-16 <sup>b</sup> | 69975-1 <sup>c</sup>           | 69770-16 <sup>d</sup><br>69771-16 <sup>e</sup> |   | 69790-1 <sup>f</sup><br>69791-1 <sup>g</sup> |
|                                | 99838-16 <sup>a</sup> | 99948-16    | 99822-16 <sup>a</sup> |                  | 69622-16 <sup>b</sup> | 69975-1 <sup>c</sup>           | 69770-16 <sup>d</sup><br>69771-16 <sup>e</sup> |   | 69790-1 <sup>f</sup><br>69791-1 <sup>g</sup> |
|                                | 99838-16 <sup>a</sup> | 99948-16    | 99822-16 <sup>a</sup> |                  | 69622-16 <sup>b</sup> | 69975-1 <sup>c</sup>           | 69770-16 <sup>d</sup><br>69771-16 <sup>e</sup> |   | 69790-1 <sup>f</sup><br>69791-1 <sup>g</sup> |
|                                | 99838-16 <sup>a</sup> | 99948-16    | 99822-16 <sup>a</sup> |                  | 69622-16 <sup>b</sup> | 69975-1 <sup>c</sup>           | 69770-16 <sup>d</sup><br>69771-16 <sup>e</sup> |   | 69790-1 <sup>f</sup><br>69791-1 <sup>g</sup> |
|                                | 99838-16 <sup>a</sup> | 99948-16    | 99822-16 <sup>a</sup> |                  | 69622-16 <sup>b</sup> | 69975-1 <sup>c</sup>           | 69770-16 <sup>d</sup><br>69771-16 <sup>e</sup> |   | 69790-1 <sup>f</sup><br>69791-1 <sup>g</sup> |
|                                | 99838-16 <sup>a</sup> | 99948-16    | 99822-16 <sup>a</sup> |                  | 69622-16 <sup>b</sup> | 69975-1 <sup>c</sup>           | 69770-16 <sup>d</sup><br>69771-16 <sup>e</sup> |   | 69790-1 <sup>f</sup><br>69791-1 <sup>g</sup> |
|                                | 99838-16 <sup>a</sup> | 99948-16    | 99822-16 <sup>a</sup> |                  | 69622-16 <sup>b</sup> | 69975-1 <sup>c</sup>           | 69770-16 <sup>d</sup><br>69771-16 <sup>e</sup> |   | 69790-1 <sup>f</sup><br>69791-1 <sup>g</sup> |
|                                | 99838-16 <sup>a</sup> | 99948-16    | 99822-16 <sup>a</sup> |                  | 69622-16 <sup>b</sup> | 69975-1 <sup>c</sup>           | 69770-16 <sup>d</sup><br>69771-16 <sup>e</sup> |   | 69790-1 <sup>f</sup><br>69791-1 <sup>g</sup> |
|                                | 99838-16 <sup>a</sup> | 99948-16    | 99822-16 <sup>a</sup> |                  | 69622-16 <sup>b</sup> | 69975-1 <sup>c</sup>           | 69770-16 <sup>d</sup><br>69771-16 <sup>e</sup> |   | 69790-1 <sup>f</sup><br>69791-1 <sup>g</sup> |

**a** Must machine cylinder heads.  
**b** Heavy wall, heat treated, for use with adjustable rocker arms.  
**c** Performance steel billet gears and roller chain set.  
**d** 1.5 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).  
**e** 1.6 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).  
**f** 1.5 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.  
**g** 1.6 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                           | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 10.5 to 11.5 compression ratio advised.   | SR-238/350-2S-12 IG              | 2800-<br>6600         | 698521 <sup>a</sup>                        | 69515-16<br>69542-16 <sup>c</sup> | 238  | 288   | 112                           | 12 46  | .020                        | .525                          |
|   |                                  |                       |  |                                   | 246  | 296   | 60 6                          | .020   | .543                        |                               |
| Good mid to upper RPM torque & HP, fair idle, moderate performance usage, mild bracket racing, good w/plate nitrous system, auto trans w/3000+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised. Good w/Roots supercharger, 14 lbs. maximum boost w/8.0 maximum compression ratio advised. | SR-246/362-2S-12 IG              | 3200-<br>7000         | 698531 <sup>a</sup>                        | 69515-16<br>69542-16 <sup>c</sup> | 246  | 283   | 112                           | 15 49  | .020                        | .543                          |
|   |                                  |                       |  |                                   | 254  | 290   | 63 9                          | .020   | .561                        |                               |
| Competition only, bracket racing, heavy car, good w/manifold nitrous system, 360+ cu.in., auto trans w/race converter, aftermarket aluminum cylinder heads required, 12.0 to 13.0 compression ratio advised.  | R-256/452-2S-10                  | 3800-<br>7800         | 698271 <sup>b</sup>                        | 69542-16 <sup>c</sup>             | 256  | 285   | 110                           | 23 53  | .020                        | .746                          |
|   |                                  |                       |  |                                   | 268  | 297   | 69 19                         | .022   | .746                        |                               |
| Good mid range torque and HP, rough idle, performance usage, oval track, bracket racing, auto trans w/race converter, 11.5 to 12.5 compression ratio advised.   | R-260/420-2S-8                   | 3800-<br>7600         | 698801 <sup>b</sup>                        | 69515-16<br>69542-16 <sup>c</sup> | 260  | 292   | 108                           | 26 54  | .020                        | .630                          |
|   |                                  |                       |  |                                   | 266  | 298   | 65 21                         | .020   | .630                        |                               |
| Competition only, good mid to upper RPM HP, oval track, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.  | R-268/420-2S1-8                  | 4000-<br>7800         | 698821 <sup>b</sup>                        | 69515-16<br>69542-16 <sup>c</sup> | 268  | 300   | 108                           | 30 58  | .020                        | .630                          |
|   |                                  |                       |  |                                   | 276  | 308   | 70 26                         | .020   | .630                        |                               |
| Competition only, good upper RPM HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.   | R-272/420-2-8                    | 4200-<br>8000         | 698831 <sup>b</sup>                        | 69515-16<br>69542-16 <sup>c</sup> | 272  | 304   | 108                           | 32 60  | .020                        | .630                          |
|   |                                  |                       |  |                                   | 282  | 314   | 72 29                         | .020   | .630                        |                               |
| Competition only, good upper RPM torque and HP, bracket racing, Super Pro, Super Gas, auto trans w/race converter, aftermarket aluminum cylinder heads required, 13.0 minimum compression ratio advised.  | R-274/482-2S-8                   | 4200-<br>8200         | 698281 <sup>b</sup>                        | 69542-16 <sup>c</sup>             | 274  | 318   | 108                           | 30 64  | .016                        | .723                          |
|   |                                  |                       |  |                                   | 278  | 334   | 72 26                         | .030   | .735                        |                               |
| Competition only, good upper RPM HP, bracket racing, auto trans w/race converter, nitrous, 12.5 minimum compression ratio advised.  | R-276/420-2-10                   | 4400-<br>8200         | 698841 <sup>b</sup>                        | 69515-16<br>69542-16 <sup>c</sup> | 276  | 308   | 110                           | 32 64  | .020                        | .630                          |
|   |                                  |                       |  |                                   | 286  | 318   | 77 29                         | .020   | .630                        |                               |
| Competition only, bracket racing, good upper RPM HP, Super Quick, Super Comp, etc., manual trans or auto w/trans brake, aftermarket aluminum cylinder heads required, 13.0 minimum compression ratio advised.   | R-280/452-2S-8                   | 5000-<br>8600         | 698291 <sup>b</sup>                        | 69542-16 <sup>c</sup>             | 280  | 309   | 108                           | 37 63  | .020                        | .678                          |
|   |                                  |                       |  |                                   | 288  | 317   | 77 31                         | .022   | .678                        |                               |
| Competition only, Super Stock or Competition elim., manual trans or auto w/trans brake, 13.5 minimum compression ratio advised.   | R-284/476S-2S-8                  | 5200-<br>9000         | 698611 <sup>b</sup>                        | 69542-16 <sup>c</sup>             | 284  | 318   | 108                           | 39 65  | .035                        | .715                          |
|   |                                  |                       |  |                                   | 292  | 326   | 79 33                         | .030   | .688                        |                               |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**NOTE:** 8620 steel billet roller camshafts for Chrysler R series cylinder blocks with 50mm, 2.000", and 60mm diameter camshaft bearing journals, and 45, 47, or 48 degree lifter bore bank angles are available on special order. Lightweight, gun drilled rear drive camshafts are also an option. Appropriate oil conducting roller lifters are also available. Contact

Crane's Performance Consultants for details.

**IMPORTANT NOTE:** Roller lifter camshafts are not intended for use in R blocks having 59 degree bank angle lifter bores. Contact Crane's Performance Consultants for details.

**NOTE:** Early 1986-91 318 (5.2L) and early 1987-91 360 (5.9L) engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller camshafts and lifters can be installed in these engines, providing

the appropriate kit components are used.

**NOTE:** To effect valve adjustment, 318, 340 and 360 engines require the use of Crane Adjustable Rocker Arms and appropriate pushrods when using roller lifter cams.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350           | See pg. 362           | See pg. 360      | See pg. 306           | See pg. 328                    | See pg. 312                                     | See pg. 315  | See pg. 320                                  |
|--------------------------------|-----------------------|-----------------------|-----------------------|------------------|-----------------------|--------------------------------|---|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS             | VALVE STEM SEALS      | VALVE STEM LOCKS | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | CAST ROCKER ARMS                                | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/ ENERGIZER GOLD RACE |  |
|                                | 99893-16 <sup>d</sup> | 99957-16              | 99822-16 <sup>d</sup> |                  | 69622-16 <sup>f</sup> | 69975-1 <sup>g</sup>           | 69770-16 <sup>h</sup><br>69771-16 <sup>h1</sup> |  | 69790-1 <sup>j</sup><br>69791-1 <sup>k</sup> |
|                                | 99893-16 <sup>d</sup> | 99957-16              | 99822-16 <sup>d</sup> |                  | 69622-16 <sup>f</sup> | 69975-1 <sup>g</sup>           | 69770-16 <sup>h</sup><br>69771-16 <sup>h1</sup> |  | 69790-1 <sup>j</sup><br>69791-1 <sup>k</sup> |
|                                | 96883-16 <sup>d</sup> | 99679-16 <sup>e</sup> | 99822-16 <sup>d</sup> |                  | 69622-16 <sup>f</sup> | 69975-1 <sup>g</sup>           | 69770-16 <sup>h</sup><br>69771-16 <sup>h1</sup> |  | 69790-1 <sup>j</sup><br>69791-1 <sup>k</sup> |
|                                | 99885-16 <sup>d</sup> | 99955-16              | 99822-16 <sup>d</sup> |                  | 69622-16 <sup>f</sup> | 69975-1 <sup>g</sup>           | 69770-16 <sup>h</sup><br>69771-16 <sup>h1</sup> |  | 69790-1 <sup>j</sup><br>69791-1 <sup>k</sup> |
|                                | 99885-16 <sup>d</sup> | 99955-16              | 99822-16 <sup>d</sup> |                  | 69622-16 <sup>f</sup> | 69975-1 <sup>g</sup>           | 69770-16 <sup>h</sup><br>69771-16 <sup>h1</sup> |  | 69790-1 <sup>j</sup><br>69791-1 <sup>k</sup> |
|                                | 99885-16 <sup>d</sup> | 99955-16              | 99822-16 <sup>d</sup> |                  | 69622-16 <sup>f</sup> | 69975-1 <sup>g</sup>           | 69770-16 <sup>h</sup><br>69771-16 <sup>h1</sup> |  | 69790-1 <sup>j</sup><br>69791-1 <sup>k</sup> |
|                                | 96883-16 <sup>d</sup> | 99679-16 <sup>e</sup> | 99822-16 <sup>d</sup> |                  | 69622-16 <sup>f</sup> | 69975-1 <sup>g</sup>           | 69770-16 <sup>h</sup><br>69771-16 <sup>h1</sup> |  | 69790-1 <sup>j</sup><br>69791-1 <sup>k</sup> |
|                                | 99885-16 <sup>d</sup> | 99955-16              | 99822-16 <sup>d</sup> |                  | 69622-16 <sup>f</sup> | 69975-1 <sup>g</sup>           | 69770-16 <sup>h</sup><br>69771-16 <sup>h1</sup> |  | 69790-1 <sup>j</sup><br>69791-1 <sup>k</sup> |
|                                | 96883-16 <sup>d</sup> | 99679-16 <sup>e</sup> | 99822-16 <sup>d</sup> |                  | 69622-16 <sup>f</sup> | 69975-1 <sup>g</sup>           | 69770-16 <sup>h</sup><br>69771-16 <sup>h1</sup> |  | 69790-1 <sup>j</sup><br>69791-1 <sup>k</sup> |
|                                | 96883-16 <sup>d</sup> | 99679-16 <sup>e</sup> | 99822-16 <sup>d</sup> |                  | 69622-16 <sup>f</sup> | 69975-1 <sup>g</sup>           | 69770-16 <sup>h</sup><br>69771-16 <sup>h1</sup> |  | 69790-1 <sup>j</sup><br>69791-1 <sup>k</sup> |

- a** Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required.
- b** Requires **69990-1** aluminum-bronze distributor drive gear.
- c** Ultra Pro Series roller lifters.
- d** Must machine cylinder heads.
- e** Titanium, must use **99098-1** single-groove valve stem locks, included with the retainers.
- f** Heavy wall, heat treated, for use with adjustable rocker arms.
- g** Performance steel billet gears and roller chain set.
- h** 1.5 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- i** 1.6 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- j** 1.5 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.
- k** 1.6 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.

# Chrysler-Dodge-Plymouth "LA" V-8 86-91

86-91 318 (5.2L) and  
87-91 360 (5.9L) cu.in.  
(except 91 Dakota)

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b>  |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Brute low end torque, for 86-91 318 (5.2L) and 87-92 360 (5.9L) TBI equipped Dodge trucks and vans (except 91 Dakota), designed to improve low end torque and HP for street performance, towing and economy.                                       | 2010                             | 800-4200              | 694101*                                    | 70530-16 <sup>a</sup> | 194<br>184                                 | 250<br>240                                    | 107                           | (6) 20<br>23 (19)                            | .000<br>.000                | .407<br>.384                  |
| Excellent low end torque, for 86-91 318 (5.2L) and 87-92 360 (5.9L) TBI equipped Dodge trucks and vans (except 91 Dakota), designed to improve low end torque and HP for street performance, and towing (50 States Legal, C.A.R.B. E.O. D-225-23). | 2020                             | 1000-4600             | 694111                                     | 70530-16 <sup>a</sup> | 204<br>194                                 | 260<br>250                                    | 112                           | (5) 29<br>34 (20)                            | .000<br>.000                | .429<br>.407                  |
| Good low end torque and HP, good idle, daily usage, towing, also mild turbocharged, computer upgrades required, 2200-3000 cruise RPM, 8.0 to 9.5 compression ratio advised.  | HR-204/286-25-14                 | 1000-4800             | 699701*                                    | 70530-16 <sup>a</sup> | 204<br>208                                 | 260<br>250                                    | 114                           | (7) 31<br>43 (15)                            | .000<br>.000                | .429<br>.438                  |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.  
**IMPORTANT NOTE:** The 1991 Dakota engines were fuel injected and used a camshaft core with a shorter nose. These would

have the same configuration as the 70-prefix camshafts listed below.  
**NOTE:** For maximum performance, and to provide the most accurate valve adjustment on hydraulic roller camshafts, the

use of our 69770-16 or 69790-1 adjustable rocker arms and special length pushrods is highly recommended.

# Chrysler-Dodge-Plymouth Magnum V-8 92-02

5.2-5.9 Litre

## Hydraulic Roller Camshafts

|  |                   |           |         |                       |            |            |     |                    |              |              |
|--|-------------------|-----------|---------|-----------------------|------------|------------|-----|--------------------|--------------|--------------|
| Brute low end torque, for 92-93 Dodge Magnum, improves low-end torque and HP, for street performance, towing and economy w/multi-point F.I. trucks and vans. (Compatible w/factory valve train.) (50 state legal, 94 and earlier Chrysler trucks with 5.2 or 5.9 eng. C.A.R.B. E.O. D-225-47)              | 2020              | 800-4600  | 704111  | 70530-16 <sup>a</sup> | 194<br>204 | 250<br>260 | 112 | (10) 24<br>39 (15) | .000<br>.000 | .434<br>.458 |
| Excellent low end torque, for 92-93 V-8, improves low and midrange torque and HP, for street performance and towing w/stock or modified multi-point F.I. trucks and vans. (Compatible w/factory valve train.) (50 state legal, 94 and earlier Chrysler trucks with 5.2 or 5.9 eng. C.A.R.B. E.O. D-225-47) | 2030              | 1200-5200 | 704121  | 70530-16 <sup>a</sup> | 204<br>208 | 260<br>264 | 114 | (7) 31<br>43 (15)  | .000<br>.000 | .458<br>.467 |
| Good low end and mid range torque, good idle, daily usage, performance and towing, off road, mild supercharged, computer upgrades required, 2200-3000 cruise RPM, 8.5 to 9.75 compression ratio advised.   | HR-208/292-251-10 | 1600-5600 | 708501* | 70530-16 <sup>a</sup> | 208<br>216 | 264<br>272 | 110 | (1) 29<br>43 (7)   | .000<br>.000 | .467<br>.482 |
| Good mid range torque and HP, good idle, daily usage, mild supercharged, cylinder head and computer upgrades required, 2600-3400 cruise RPM, 8.75 to 10.5 compression ratio advised.   | HR-214/325-25-14  | 1800-5800 | 708511* | 70530-16 <sup>a</sup> | 214<br>220 | 276<br>282 | 114 | (2) 36<br>49 (9)   | .000<br>.000 | .520<br>.531 |
| Good mid to upper RPM torque and HP, fair idle, moderate performance usage, cylinder head and computer upgrades required, 3000-3800 cruise RPM, 9.5 to 11.0 compression ratio advised. good w/supercharger, 10 lbs. max. boost w/8.0 max. compression ratio advised.                                       | HR-222/339-25-14  | 2200-6200 | 708521* | 70530-16 <sup>a</sup> | 222<br>226 | 284<br>288 | 114 | 2 40<br>52 (6)     | .000<br>.000 | .542<br>.552 |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon applications.

**NOTE:** 1992-2002 5.2L and 5.9L Magnum engines no longer use shaft mount rocker arms, but instead have individually mounted non-adjustable 1.6 ratio pedestal rockers. For street applications, Crane offers a method to convert to stud mounted adjustable rocker arms without cylinder

head removal or machining. Install Pushrod guideplate and Rocker Arm Stud Conversion Kit, 36655-16, along with aluminum roller rocker arms (such as 11776-16, 11746-16, or 11759-16). Pushrods, 36621-16, are also required. Valve cover clearance will have to be checked.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337   | See pg. 350 | See pg. 362      | See pg. 360      | See pg. 306 | See pg. 328                    | See pg. 312           | See pg. 315   | See pg. 320          |
|--------------------------------|---------------|-------------|------------------|------------------|-------------|--------------------------------|-----------------------|---|----------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS | RETAINERS   | VALVE STEM SEALS | VALVE STEM LOCKS | PUSHRODS    | TIMING CHAIN AND GEAR ASSEMBLY | CAST ROCKER ARMS      | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE            |
|                                |               |             |                  |                  |             | 69975-1 <sup>b</sup>           | 69770-16 <sup>c</sup> |   | 69790-1 <sup>d</sup> |
|                                |               |             |                  |                  |             | 69975-1 <sup>b</sup>           | 69770-16 <sup>c</sup> |   | 69790-1 <sup>d</sup> |
|                                |               |             |                  |                  |             | 69975-1 <sup>b</sup>           | 69770-16 <sup>c</sup> |   | 69790-1 <sup>d</sup> |

- a For use with standard Chrysler alignment bars.
- b Performance steel billet gears and roller chain set.
- c 1.5 ratio rocker arms, adjustable, must use special Crane pushrods (shafts not included).
- d 1.5 ratio rocker arm kit with rocker shafts, adjustable, must use special Crane pushrods.

|  |                       |                      |  |                       |
|--|-----------------------|----------------------|--|-----------------------|
|  | 36621-16 <sup>f</sup> | 69975-1 <sup>g</sup> | 11776-16 <sup>h</sup><br>11746-16 <sup>i</sup> | 11759-16 <sup>j</sup> |
|  | 36621-16 <sup>f</sup> | 69975-1 <sup>g</sup> | 11776-16 <sup>h</sup><br>11746-16 <sup>i</sup> | 11759-16 <sup>j</sup> |
|  | 36621-16 <sup>f</sup> | 69975-1 <sup>g</sup> | 11776-16 <sup>h</sup><br>11746-16 <sup>i</sup> | 11759-16 <sup>j</sup> |
|  | 36621-16 <sup>f</sup> | 69975-1 <sup>g</sup> | 11776-16 <sup>h</sup><br>11746-16 <sup>i</sup> | 11759-16 <sup>j</sup> |
|  | 36621-16 <sup>f</sup> | 69975-1 <sup>g</sup> | 11776-16 <sup>h</sup><br>11746-16 <sup>i</sup> | 11759-16 <sup>j</sup> |

- e For use with standard Chrysler alignment bars.
- f Heavy wall, heat treated, for use with **36655-16** Pushrod Guideplate and Rocker Arm Stud Conversion Kit.
- g Performance steel billet gears and roller chain set.
- h Crane Classic extruded, 1.6 ratio, for use with **36655-16** Pushrod Guideplate and Rocker Arm Stud Conversion Kit. Requires **36621-16** pushrods.
- i Energizer, 1.6 ratio, for use with **36655-16** Pushrod Guideplate and Rocker Arm Stud Conversion Kit. Requires **36621-16** pushrods.
- j 1.6 ratio, for use with **36655-16** Pushrod Guideplate and Rocker Arm Stud Conversion Kit. Requires **36621-16** pushrods.

### COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS      | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|--------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b>   |                                  |                       |  |              |  |   |                               |  |                             |                               |
| Excellent low end and mid range torque and HP, smooth idle, daily usage, off road, towing, economy, MDS compatible, 2200-2600 cruise RPM.                   | <b>HR-208/297-2S-16</b>          | 1000-5000             | <b>1989491*</b>                            | <sup>a</sup> | 208<br>214                                 | 268<br>274                                    | 116                           | (10.5) 38.5<br>44.5(10.5)                    | .000<br>.000                | .505<br>.505                  |
|   |                                  |                       | ◆<br>3                                     |              |  |   |                               |  |                             |                               |
| Excellent low end and mid range torque and HP, smooth idle, daily usage, off road, towing, economy, valve spring upgrade required, 2200-2600 cruise RPM.    | <b>HR-210/3236-2S-12</b>         | 1200-5200             | <b>1989501*</b>                            | <sup>b</sup> | 210<br>216                                 | 268<br>274                                    | 112                           | (2) 32<br>45 (9)                             | .000<br>.000                | .550<br>.550                  |
|   |                                  |                       | ◆<br>3                                     |              |  |   |                               |  |                             |                               |
| Good mid range torque and HP, good idle, daily usage, also mild supercharged or nitrous, valve spring and computer upgrades required, 2400-2800 cruise RPM. | <b>HR-216/3236-2S-12</b>         | 1800-5800             | <b>1989511*</b>                            | <sup>b</sup> | 216<br>222                                 | 274<br>280                                    | 112                           | 1 35<br>48 (6)                               | .000<br>.000                | .550<br>.550                  |
|   |                                  |                       | ◆<br>3                                     |              |  |   |                               |  |                             |                               |
| Good upper RPM HP, fair idle, radical street, valve spring and computer upgrades required, 2600-3000 cruise RPM.  | <b>HR-222/3236-2S-14</b>         | 2200-6200             | <b>1989521*</b>                            | <sup>b</sup> | 222<br>228                                 | 280<br>286                                    | 114                           | (3) 45<br>48 0                               | .000<br>.000                | .550<br>.550                  |
|   |                                  |                       | ◆<br>3                                     |              |  |   |                               |  |                             |                               |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337   | See pg. 350 | See pg. 362      | See pg. 360      | See pg. 306 | See pg. 328                    | See pg. 312      | See pg. 315   | See pg. 317 |
|--------------------------------|---------------|-------------|------------------|------------------|-------------|--------------------------------|------------------|---|-------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS | RETAINERS   | VALVE STEM SEALS | VALVE STEM LOCKS | PUSHRODS    | TIMING CHAIN AND GEAR ASSEMBLY | CAST ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
| 99831-16 <sup>c</sup>          |               |             |                  |                  |             |                                |                  |   |             |
| 99831-16 <sup>c</sup>          |               |             |                  |                  |             |                                |                  |   |             |
| 99831-16 <sup>c</sup>          |               |             |                  |                  |             |                                |                  |   |             |
| 99831-16 <sup>c</sup>          |               |             |                  |                  |             |                                |                  |   |             |

- a Re-use standard lifters.
- b Must use non-MDS lifters.
- c Compatible with standard retainers and valve stem locks.

# Chrysler Big Block V8 Tech Tips & Notes

## 1958-1978 350-361-383-400-413-426-440 B & RB V8

The B and RB Big Block Chrysler engines vary primarily due to cylinder block deck height differences. Intake manifolds, distributor housings, and pushrod lengths are noticeable changes from one to the other. The B (Low Block) engines are 350-361-383-400- (1962) 413, while RB (High Block) engines are 413-426-400 cu.in. Characterized by inline lifter bores in the block, inline valves in the cylinder heads, 1.5:1 ratio shaft mounted rocker arms, and a front mounted distributor, these engines were used throughout Chrysler's product lines for over two decades. Be aware that there are reverse rotation marine, and also gear drive cam industrial versions of these engines, that require unique camshafts.

Early cylinder heads had removable rocker pedestals for the rocker shafts, as did the 1960's performance engines (Stage II, Stage III, Max Wedge, etc., which also featured adjustable rocker arms and mechanical lifter camshafts), while later heads have integral shaft stands.

From 1958 to 1969, all camshafts used a single bolt to retain the cam sprocket. These have been the Crane 64 prefix camshafts, with hydraulic and mechanical flat faced lifter grinds offered. In 1970, the 440 Six Pack engines were upgraded by having a three bolt configuration camshaft installed. These are our 68 prefix items, which include hydraulic, mechanical, retrofit hydraulic roller, and mechanical roller camshafts and components. The single bolt and three bolt camshafts can be interchanged among these engines, providing the appropriate timing set is used. **Due to their superior reliability, we will now be offering only the 68 prefix three bolt camshafts for their engines.**

The Chrysler Hemi 426 camshafts will also physically fit into the B engines, but due to their different lobe layout, only four cylinders would function properly.

Our offerings include retrofit 8620 steel billet hydraulic roller camshafts and steel billet roller lifters to provide an excellent torque and power band increase. The lifters are a drop in type (no block machining, or lifter bore sleeving required), having a vertical locking bar to prevent rotation. Special pushrods are required due to the increased height of the lifters.

Our steel billet mechanical roller camshafts are available in standard firing order (1-8-4-3-6-5-7-2) and SFO (1-8-7-3-6-5-4-2) firing orders. Roller camshafts for the Chrysler Mega blocks with 47 degree lifter bank angles, and other aftermarket blocks having 48 degree lifter bank angles are also available. Roller camshafts with 2.125" diameter journals can be custom ordered. Engines equipped with Koffel B1 cylinder heads will require grooving the fourth camshaft bearing journal for proper upper end lubrication, optional labor number **98088** accomplishes this. All of our roller lifters are designed to drop into the block, with no machining or lifter bore sleeving required.

Early raised cam Chrysler Mega blocks had very tall lifter bores and a 47 degree lifter bore bank angle, so part number **66554-16** roller lifters (with the pushrod seats and

guidebars raised .400") can be used to avoid additional block machining. Special camshafts are also required for the change in lifter bank angle, so be certain of what you have before ordering.

Aftermarket cylinder heads may require different rocker arms, shafts, pushrods, valve springs, retainers, locks, etc, than standard. Make sure of exactly what you need before ordering additional components.

## 1966-1971 426 Hemi V8

The famed 426 Hemi is related to the RB V8. One primary change to the cylinder block includes additional head bolt bosses for the Hemi head's internal attaching bolts. These cylinder heads utilize the classic Chrysler double shaft system for the intake and exhaust rockers. Standard rocker ratios are 1.57:1 intake, and 1.52:1 exhaust. Lifter bores are inline, inclined at a 45 degree bank angle. These engines are indicated by our 66 prefix.

There were also 1964 -1965 426 Hemi 426 engines that had single bolt camshafts. We recommend using the later three bolt configuration camshafts and timing sets in these engines (no other modifications required) for increased reliability. The Chrysler B/RB camshafts will physically fit into the Hemi engines, but due to their different lobe layout, only four cylinders will function properly.

The currently available aftermarket cylinder blocks have either standard or raised camshaft locations. Most of the raised camshaft blocks have the lifter bores changed to a 48 degree lifter bank angle, for better pushrod geometry. Special camshafts are required to maintain proper cam timing for each side of the engine. Early raised cam Chrysler Mega blocks had very tall lifter bores and a 50 degree lifter bore bank angle, so part number **66554-16** roller lifters (with the pushrod seats and guidebars raised .400") can be used to avoid additional block machining. Special camshafts are also required for this unique change in lifter bank angle. Some replacement iron blocks may also have tall lifter bores. Check your lifter guidebar to block clearance before final engine assembly in the event that modifications are required.

The aftermarket blocks may also have relocated lifter bore spacing. While the standard lifter centerline spacing is 1.812", there are also popular "Spread .100" (1.900") and "Spread .200" (2.000") configurations. Be sure of your spacing when ordering roller lifters so that you don't exceed the travel capabilities of the guidebar.

We offer hydraulic, retrofit hydraulic roller, mechanical, and mechanical roller camshafts and components for these engines. When installing our hydraulic roller camshafts and retrofit lifters, machining will be required on the block and cylinder heads to provide clearance for the pushrods. This is due to the increased pushrod seat height on the hydraulic roller lifters, changing the angle of the pushrods. Our roller lifters are designed to drop into the block, with no machining or lifter bore sleeving required.



Street roller camshafts are also offered, with their superior torque and horsepower potential popular among the Hemi crowd.

Mechanical roller camshafts are available with standard stepped journal diameters, 2.125" - BB suffix journal diameters (with standard or SFO (1-8-7-3-6-5-4-2) firing orders for standard 45 degree, or 48 degree lifter bank angle blocks), and 60mm (2.362") - 60J suffix journal diameters (with standard or SFO firing orders). These larger journal camshafts have a stepped front journal, so that a standard timing set can be used. The larger journal camshafts are machined for 3/8" - 24 bolts to attach the timing set, requiring special shouldered bolts, and two 5/16" dowel pins are installed. For increased oil distribution to the valve train area, we can machine the oil groove in the fourth camshaft bearing journal to a larger size. This can be performed under labor number **98088**.

While the standard valve stem diameter for these engines is 5/16", aftermarket heads are commonly set up for 11/32" valve stems. Some heads for supercharged fuel applications may have 3/8" exhaust valve stems. Verify your valve stem diameter when ordering retainers and valve locks.

### **HEMI 99 500 V8**

This engine was developed specifically for maximum performance drag racing applications, and never installed in any vehicles, nor sold as a complete assembly. Designated by our 159 prefix, we offer custom ground 8620 steel billet roller camshafts with 60mm (2.362") bearing journals, and the SFO (1-8-7-3-6-5-4-2) firing order.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number             | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code     | LIFTERS   | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|--|-----------------------|--|---|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |  |                       |  |   |  |   |                               |  |                             |                               |
| Excellent low end torque, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised                          | <b>H-260-2</b>                               | 1200-4800             | <b>683901*</b><br><b>683902*<sup>a,b</sup></b> | <b>99278-16<sup>b</sup></b>                                 | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000                | .427<br>.454                  |
|  |  |                       | <b>3</b>                                       |   |  |   |                               |  |                             |                               |
| Replacement for factory 335 HP 383 cu.in. camshaft.  | <b>BluePrinted<br/>2843564<br/>(3512907)</b> | 1400-5000             | <b>680101</b>                                  | <b>99278-16<sup>b</sup></b>                                 | 214<br>226                                 | 272<br>292                                    | 115                           | (5) 39<br>51 (5)                             | .000<br>.000                | .447<br>.464                  |
|  |  |                       | <b>1</b>                                       |   |  |   |                               |  |                             |                               |
| Excellent low end and mid range torque and HP, good idle, daily usage, off road, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.    | <b>H-272-2</b>                               | 1600-5400             | <b>683941*</b><br><b>683942*<sup>a,b</sup></b> | <b>99278-16<sup>b</sup></b>                                 | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000                | .454<br>.480                  |
|  |  |                       | <b>3</b>                                       |   |  |   |                               |  |                             |                               |
| Good mid range torque and HP, good idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.                                       | <b>H-222/3114-25-12</b>                      | 1800-5600             | <b>680321*</b>                                 | <b>99278-16<sup>b</sup></b><br><b>99378-16*<sup>c</sup></b> | 222<br>234                                 | 278<br>290                                    | 112                           | 4 38<br>54 0                                 | .000<br>.000                | .467<br>.494                  |
|  |  |                       | <b>3</b>                                       |   |  |   |                               |  |                             |                               |
| Good mid range torque and HP, good idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised. Also mild supercharged.               | <b>H-278-2</b>                               | 1800-5600             | <b>683801*</b><br><b>683802*<sup>a,b</sup></b> | <b>99278-16<sup>b</sup></b><br><b>99378-16*<sup>c</sup></b> | 222<br>234                                 | 278<br>290                                    | 114                           | 2 40<br>56 (2)                               | .000<br>.000                | .467<br>.494                  |
|  |  |                       | <b>3</b>                                       |   |  |   |                               |  |                             |                               |
| Good mid range to upper RPM torque and HP, fair idle, moderate performance usage, 400+ cu.in., bracket racing, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised.                | <b>H-286</b>                                 | 2200-6000             | <b>684321*</b>                                 | <b>99278-16<sup>b</sup></b><br><b>99378-16*<sup>c</sup></b> | 226<br>226                                 | 286<br>286                                    | 112                           | 6 40<br>50 (4)                               | .000<br>.000                | .471<br>.471                  |
|  |  |                       | <b>3</b>                                       |   |  |   |                               |  |                             |                               |
| Excellent mid range torque and HP, rough idle, bracket racing w/heavy car, auto trans w/2500+ converter, 10.0 to 11.5 compression ratio advised.   | <b>H-228/3200-25-8</b>                       | 2600-6400             | <b>680591*</b>                                 | <b>99278-16<sup>b</sup></b><br><b>99378-16*<sup>c</sup></b> | 228<br>234                                 | 284<br>290                                    | 108                           | 11 37<br>50 4                                | .000<br>.000                | .480<br>.494                  |
|  |  |                       | <b>3</b>                                       |   |  |   |                               |  |                             |                               |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, mild bracket racing, auto trans w/3000+ converter, 3800-4200 cruise RPM, 10.0 to 11.5 compression ratio advised. | <b>H-302-2</b>                               | 2800-6600             | <b>684561*</b>                                 | <b>99278-16<sup>b</sup></b><br><b>99378-16*<sup>c</sup></b> | 232<br>242                                 | 302<br>312                                    | 112                           | 9 43<br>58 4                                 | .000<br>.000                | .504<br>.528                  |
|  |  |                       | <b>3</b>                                       |   |  |   |                               |  |                             |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

NOTE: These three-bolt camshafts can be used in engines originally equipped with single-bolt camshafts if the appropriate timing chain and gear assembly, 68975-1 or 68977-1 s used.

NOTE: Camshafts for Chrysler Mega Blocks with 47 degree lifter bore bank angles, and aftermarket blocks with 48 degree lifter bore bank angles are available on special order.

NOTE: For maximum performance, and to provide the most accurate valve adjustment on hydraulic lifter camshafts, the use of our 64770-16 adjustable rocker arms and 64640-16 (low block) or 64641-16 (high block) pushrods is highly recommended. Adjustable rocker arms and appropriate pushrods are required for use with mechanical lifter camshafts.

NOTE: Low Block Engines are 350-361-383-400 cu.in., while High Block Engines are 413-426-440 cu.in.

**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>    | <i>See pg. 350</i> | <i>See pg. 362</i>    | <i>See pg. 360</i> | <i>See pg. 306</i>                             | <i>See pg. 328</i>                           | <i>See pg. 312</i>                             | <i>See pg. 315</i>                                  | <i>See pg. 320</i>                           |
|--------------------------------|-----------------------|--------------------|-----------------------|--------------------|--|--|--|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS          | VALVE STEM SEALS      | VALVE STEM LOCKS   | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | CAST ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                    |
| 64308-1 <sup>d</sup>           | 99839-16 <sup>e</sup> | 99957-16           |                       |                    | 64640-16 <sup>g</sup><br>64641-16 <sup>h</sup> | 68975-1 <sup>i</sup><br>68977-1 <sup>j</sup> | 64770-16 <sup>k</sup><br>64771-16 <sup>l</sup> |   | 64790-1 <sup>m</sup><br>64791-1 <sup>n</sup> |
| 64308-1 <sup>d</sup>           | 99839-16 <sup>e</sup> | 99957-16           |                       |                    | 64640-16 <sup>g</sup><br>64641-16 <sup>h</sup> | 68975-1 <sup>i</sup><br>68977-1 <sup>j</sup> | 64770-16 <sup>k</sup><br>64771-16 <sup>l</sup> |   | 64790-1 <sup>m</sup><br>64791-1 <sup>n</sup> |
| 64308-1 <sup>d</sup>           | 99839-16 <sup>e</sup> | 99957-16           |                       |                    | 64640-16 <sup>g</sup><br>64641-16 <sup>h</sup> | 68975-1 <sup>i</sup><br>68977-1 <sup>j</sup> | 64770-16 <sup>k</sup><br>64771-16 <sup>l</sup> |   | 64790-1 <sup>m</sup><br>64791-1 <sup>n</sup> |
| 64308-1 <sup>d</sup>           | 99839-16 <sup>e</sup> | 99957-16           |                       |                    | 64640-16 <sup>g</sup><br>64641-16 <sup>h</sup> | 68975-1 <sup>i</sup><br>68977-1 <sup>j</sup> | 64770-16 <sup>k</sup><br>64771-16 <sup>l</sup> |   | 64790-1 <sup>m</sup><br>64791-1 <sup>n</sup> |
| 64308-1 <sup>d</sup>           | 99839-16 <sup>e</sup> | 99957-16           |                       |                    | 64640-16 <sup>g</sup><br>64641-16 <sup>h</sup> | 68975-1 <sup>i</sup><br>68977-1 <sup>j</sup> | 64770-16 <sup>k</sup><br>64771-16 <sup>l</sup> |   | 64790-1 <sup>m</sup><br>64791-1 <sup>n</sup> |
|                                | 99839-16 <sup>e</sup> | 99954-16           | 99822-16 <sup>b</sup> |                    | 64640-16 <sup>g</sup><br>64641-16 <sup>h</sup> | 68975-1 <sup>i</sup><br>68977-1 <sup>j</sup> | 64770-16 <sup>k</sup><br>64771-16 <sup>l</sup> |   | 64790-1 <sup>m</sup><br>64791-1 <sup>n</sup> |
|                                | 99839-16 <sup>e</sup> | 99954-16           | 99822-16 <sup>b</sup> |                    | 64640-16 <sup>g</sup><br>64641-16 <sup>h</sup> | 68975-1 <sup>i</sup><br>68977-1 <sup>j</sup> | 64770-16 <sup>k</sup><br>64771-16 <sup>l</sup> |   | 64790-1 <sup>m</sup><br>64791-1 <sup>n</sup> |

**Section Continued**

- a** Cam and Lifter Kit, includes installation lubricants.
- b** For 68-78 engines.
- c** For 68-78 engines, optional Hi Intensity hydraulic lifters, see page 292 for details.
- d** Contains standard diameter valve springs, no machining required.
- e** Standard diameter valve springs, no machining required.
- f** Must machine cylinder heads.
- g** Heavy wall, heat treated, for Low Block engines with adjustable rocker arms.
- h** Heavy wall, heat treated, for High Block engines with adjustable rocker arms.
- i** Performance steel billet gears and roller chain set.
- j** Pro Series steel billet gears and roller chain set with thrust bearing.
- k** 1.5 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- l** 1.6 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- m** 1.5 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.
- n** 1.6 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| Good mid range to upper RPM torque and HP, rough idle, performance usage, mild bracket racing, auto trans w/3000+ converter, 3800-4200 cruise RPM, modern upgrade from factory Six-Pack camshaft, 10.0 to 11.5 compression ratio advised.          | <b>H-236/348-25-12</b>           | 3000-<br>6800         | <b>680601*</b>                             | <b>99278-16</b> | 236  | 292   | 112                           | 11 45  | .000                        | .522                          |
|  |                                  |                       |  |                 | 244  | 300   | 59 5                          | .000   | .543                        |                               |
| Strong mid range torque, rough idle, bracket racing, serious off road, auto trans w/3000+ converter, 10.5 to 12.0 compression ratio advised.   | <b>H-238/3347-6</b>              | 3000-<br>6800         | <b>680651*</b>                             | <b>99278-16</b> | 238  | 294   | 106                           | 17 41  | .000                        | .502                          |
|  |                                  |                       |  |                 | 238  | 294   | 49 9                          | .000   | .502                        |                               |
| Good upper RPM torque and HP, Pro Street with 440+ cu.in., rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 4200-4600 cruise RPM, 10.5 to 12.0 compression ratio advised.  | <b>H-312-2</b>                   | 3200-<br>7000         | <b>684571*</b>                             | <b>99278-16</b> | 242  | 312   | 112                           | 14 48  | .000                        | .528                          |
|  |                                  |                       |  |                 | 252  | 322   | 63 9                          | .000   | .552                        |                               |
| Moderate competition only, rough idle, good upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, 10.5 to 12.0 compression ratio advised.   | <b>H-242/3520-2-8</b>            | 3600-<br>7200         | <b>680701*</b>                             | <b>99278-16</b> | 242  | 314   | 108                           | 18 44  | .000                        | .528                          |
|  |                                  |                       |  |                 | 252  | 324   | 59 13                         | .000   | .552                        |                               |
| Good upper RPM torque and HP, Pro Street with 440+ cu.in., rough idle, performance usage, bracket racing, auto trans w/3500+ converter, aftermarket aluminum cylinder heads advised, 4200-4600 cruise RPM, 11.0 to 12.5 compression ratio advised. | <b>H-244/362-25-12</b>           | 3800-<br>7200         | <b>680711*</b>                             | <b>99278-16</b> | 244  | 300   | 112                           | 15 49  | .000                        | .543                          |
|  |                                  |                       |  |                 | 252  | 308   | 63 9                          | .000   | .564                        |                               |
| Performance usage, good upper RPM and HP, Pro Street with 440+ cu.in., rough idle, bracket racing, auto trans w/3800+ converter, aftermarket aluminum cylinder heads advised, 11.5 to 13.0 compression ratio advised.                              | <b>H-248/369-25-12</b>           | 4000-<br>7200         | <b>680721*</b>                             | <b>99278-16</b> | 248  | 304   | 112                           | 17 51  | .000                        | .554                          |
|  |                                  |                       |  |                 | 256  | 312   | 65 11                         | .000   | .575                        |                               |
| Moderate competition only, good upper RPM HP, bracket racing, 440+ cu.in., auto trans w/4000+ converter, 12.0 minimum compression ratio advised.   | <b>H-252/3680-2-8</b>            | 4000-<br>7200         | <b>680761*</b>                             | <b>99278-16</b> | 252  | 324   | 108                           | 23 49  | .000                        | .552                          |
|  |                                  |                       |  |                 | 262  | 334   | 64 18                         | .000   | .576                        |                               |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**NOTE:** These three-bolt camshafts can be used in engines originally equipped with single-bolt camshafts if the appropriate timing chain and gear assembly, 68975-1 or 68977-1 is used.

**NOTE:** Camshafts for Chrysler Mega Blocks with 47 degree lifter bore bank angles, and aftermarket blocks with 48 degree lifter bore bank angles are available on special order.

**NOTE:** For maximum performance, and to provide the most accurate valve adjustment on hydraulic lifter camshafts, the use of our 64770-16 adjustable rocker arms and 64640-16 (low block) or 64641-16 (high block) pushrods is highly

recommended. Adjustable rocker arms and appropriate pushrods are required for use with mechanical lifter camshafts.

**NOTE:** Low Block Engines are 350-361-383-400 cu.in., while High Block Engines are 413-426-440 cu.in.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360      | See pg. 306                                    | See pg. 328                                  | See pg. 312                                    | See pg. 315   | See pg. 320                                  |
|--------------------------------|-----------------------|-------------|-----------------------|------------------|--|--|--|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | CAST ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/ GOLD RACE<br>ENERGIZER |  |
|                                | 99890-16 <sup>b</sup> | 99970-16    | 99822-16 <sup>b</sup> |                  | 64640-16 <sup>c</sup><br>64641-16 <sup>d</sup> | 68975-1 <sup>e</sup><br>68977-1 <sup>f</sup> | 64770-16 <sup>g</sup><br>64771-16 <sup>h</sup> |   | 64790-1 <sup>i</sup><br>64791-1 <sup>j</sup> |
|                                | 99890-16 <sup>b</sup> | 99970-16    | 99822-16 <sup>b</sup> |                  | 64640-16 <sup>c</sup><br>64641-16 <sup>d</sup> | 68975-1 <sup>e</sup><br>68977-1 <sup>f</sup> | 64770-16 <sup>g</sup><br>64771-16 <sup>h</sup> |   | 64790-1 <sup>i</sup><br>64791-1 <sup>j</sup> |
|                                | 99890-16 <sup>b</sup> | 99970-16    | 99822-16 <sup>b</sup> |                  | 64640-16 <sup>c</sup><br>64641-16 <sup>d</sup> | 68975-1 <sup>e</sup><br>68977-1 <sup>f</sup> | 64770-16 <sup>g</sup><br>64771-16 <sup>h</sup> |   | 64790-1 <sup>i</sup><br>64791-1 <sup>j</sup> |
|                                | 99890-16 <sup>b</sup> | 99970-16    | 99822-16 <sup>b</sup> |                  | 64640-16 <sup>c</sup><br>64641-16 <sup>d</sup> | 68975-1 <sup>e</sup><br>68977-1 <sup>f</sup> | 64770-16 <sup>g</sup><br>64771-16 <sup>h</sup> |   | 64790-1 <sup>i</sup><br>64791-1 <sup>j</sup> |
|                                | 99890-16 <sup>b</sup> | 99970-16    | 99822-16 <sup>b</sup> |                  | 64640-16 <sup>c</sup><br>64641-16 <sup>d</sup> | 68975-1 <sup>e</sup><br>68977-1 <sup>f</sup> | 64770-16 <sup>g</sup><br>64771-16 <sup>h</sup> |   | 64790-1 <sup>i</sup><br>64791-1 <sup>j</sup> |
|                                | 99890-16 <sup>b</sup> | 99970-16    | 99822-16 <sup>b</sup> |                  | 64640-16 <sup>c</sup><br>64641-16 <sup>d</sup> | 68975-1 <sup>e</sup><br>68977-1 <sup>f</sup> | 64770-16 <sup>g</sup><br>64771-16 <sup>h</sup> |   | 64790-1 <sup>i</sup><br>64791-1 <sup>j</sup> |
|                                | 99890-16 <sup>b</sup> | 99970-16    | 99822-16 <sup>b</sup> |                  | 64640-16 <sup>c</sup><br>64641-16 <sup>d</sup> | 68975-1 <sup>e</sup><br>68977-1 <sup>f</sup> | 64770-16 <sup>g</sup><br>64771-16 <sup>h</sup> |   | 64790-1 <sup>i</sup><br>64791-1 <sup>j</sup> |

- a Optional Hi Intensity hydraulic lifters, see page 292 for details.
- b Must machine cylinder heads.
- c Heavy wall, heat treated, for Low Block engines with adjustable rocker arms.
- d Heavy wall, heat treated, for High Block engines with adjustable rocker arms.
- e Performance steel billet gears and roller chain set.
- f Pro Series steel billet gears and roller chain set with thrust bearing.
- g 1.5 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- h 1.6 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- i 1.5 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.
- j 1.6 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Brute low end torque, smooth idle, daily usage, towing, economy, also mild turbocharged, 2200-3000 cruise RPM, 8.0 to 9.5 compression ratio advised.  | HR-204/286-2-12                  | 800-5200              | 689501 <sup>a</sup>                        | 68532-16 <sup>b</sup> | 204  | 260   | 112                           | (5) 29                                       | .000                        | .429                          |
|   |                                  |                       |  |                       | 214  | 270   |                               | 44 (10)                                      | .000                        | .452                          |
| Excellent low end and mid range torque and HP, good idle, daily usage, off road, performance and fuel efficiency, 2600-3400 cruise RPM, 8.75 to 10.5 compression ratio advised.   | HR-214/325-2S-12                 | 1400-5600             | 689511 <sup>a</sup>                        | 68532-16 <sup>b</sup> | 214  | 276   | 112                           | 0 34   | .000                        | .488                          |
|   |                                  |                       |  |                       | 222  | 284   |                               | 48 (6)                                       | .000                        | .509                          |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3000-3800 cruise RPM, 9.5 to 10.75 compression ratio advised.   | HR-222/339-2S-12                 | 1800-6000             | 689521 <sup>a</sup>                        | 68532-16 <sup>b</sup> | 222  | 284   | 112                           | 4 38   | .000                        | .509                          |
|   |                                  |                       |  |                       | 230  | 292   |                               | 52 (2)                                       | .000                        | .528                          |
| Good mid range torque and HP, fair idle, performance usage, 3600-4400 cruise RPM, excellent for 440 Six-Pack, mild supercharged, 10.0 to 11.5 compression ratio advised.  | HR-230/352-2S-12                 | 2200-6400             | 689531 <sup>a</sup>                        | 68532-16 <sup>b</sup> | 230  | 292   | 112                           | 8 42   | .000                        | .528                          |
|   |                                  |                       |  |                       | 236  | 298   |                               | 55 1   | .000                        | .539                          |
| Good mid to upper RPM torque and HP, fair idle, performance usage, 3800-4600 cruise RPM, mild supercharged, 10.5 to 12.0 compression ratio advised.   | HR-234/359-2S-12                 | 2600-6600             | 689551 <sup>a</sup>                        | 68532-16 <sup>b</sup> | 234  | 296   | 112                           | 10 44  | .000                        | .539                          |
|   |                                  |                       |  |                       | 242  | 304   |                               | 58 4   | .000                        | .558                          |
| Performance usage, good mid range torque and HP, rough idle, bracket racing w/heavy car, 440+ cu.in., auto trans w/3000+ converter, 4000-4800 cruise RPM, 10.5 to 12.0 compression ratio advised.   | HR-240/365-2S-10                 | 2800-6600             | 689561 <sup>a</sup>                        | 68532-16 <sup>b</sup> | 240  | 302   | 110                           | 15 45  | .000                        | .548                          |
|   |                                  |                       |  |                       | 248  | 310   |                               | 59 9   | .000                        | .558                          |
| Good mid range and upper RPM torque and HP, rough idle, performance usage, bracket racing, 440+ cu.in., auto trans w/3200+ converter, 4000-4800 cruise RPM, good w/mild supercharged or plate nitrous system, 11.5 to 13.0 compression ratio advised.   | HR-240/365-2S-14                 | 3000-6800             | 689541 <sup>a</sup>                        | 68532-16 <sup>b</sup> | 240  | 302   | 114                           | 11 49  | .000                        | .548                          |
|   |                                  |                       |  |                       | 248  | 310   |                               | 63 5   | .000                        | .558                          |
| Good upper RPM torque and HP, performance usage, bracket racing, 470+ cu.in., auto trans w/3500+ converter, good w/manifold nitrous system, 12.0 to 13.5 compression ratio advised. Good w/supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised.   | HR-248/372-2S-14                 | 3200-7000             | 689571 <sup>a</sup>                        | 68532-16 <sup>b</sup> | 248  | 310   | 114                           | 15 53  | .000                        | .558                          |
|   |                                  |                       |  |                       | 256  | 318   |                               | 67 9   | .000                        | .558                          |
| Performance usage, good upper RPM torque and HP, bracket racing, 490+ cu.in., aftermarket aluminum cylinder heads advised, auto trans w/3500+ converter, good w/ large manifold nitrous system, 12.5 minimum compression ratio advised. Good w/supercharger, 22 lbs. max. boost w/8.5 max. compression ratio advised. | HR-254/400-2S-14                 | 3400-7000             | 689701 <sup>a</sup>                        | 68532-16 <sup>b</sup> | 254  | 324   | 114                           | 17.5 56.5                                    | .000                        | .600                          |
|   |                                  |                       |  |                       | 262  | 332   |                               | 69.5 12.5                                    | .000                        | .600                          |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

NOTE: These three-bolt camshafts can be used in engines originally equipped with single-bolt camshafts if the appropriate timing chain and gear assembly, 68975-1 or 68977-1 is used.

NOTE: Camshafts for Chrysler Mega Blocks with 47 degree lifter bore bank angles, and aftermarket blocks with 48 degree lifter bore bank angles are available on special order.

NOTE: For maximum performance, and to provide the most accurate valve adjustment on hydraulic roller camshafts, the use of our 64770-16 adjustable rocker arms and 64628-16 (low block) or 64629-16 (high block) pushrods is highly recommended. Otherwise, special length pushrods will be required. See page 305 for special pushrod ordering instructions.

NOTE: Low Block Engines are 350-361-383-400 cu.in., while High Block Engines are 413-426-440 cu.in.

NOTE: For engines equipped with B-1 cylinder heads, the fourth cam bearing journal must be grooved for proper oiling. Labor operation 98088 is an available option for this service.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                      | See pg. 350                       | See pg. 362           | See pg. 360      | See pg. 306                                    | See pg. 328                                  | See pg. 312                                    | See pg. 315   | See pg. 320                                  |
|--------------------------------|--|-----------------------------------|-----------------------|------------------|--|--|--|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                    | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | CAST ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                    |
|                                | 99893-16 <sup>c</sup><br>99832-16 <sup>c,d</sup> | 99969-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>c</sup> |                  | 64628-16 <sup>f</sup><br>64629-16 <sup>g</sup> | 68975-1 <sup>h</sup><br>68977-1 <sup>i</sup> | 64770-16 <sup>j</sup><br>64771-16 <sup>k</sup> |   | 64790-1 <sup>l</sup><br>64791-1 <sup>m</sup> |
|                                | 99893-16 <sup>c</sup><br>99832-16 <sup>c,d</sup> | 99969-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>c</sup> |                  | 64628-16 <sup>f</sup><br>64629-16 <sup>g</sup> | 68975-1 <sup>h</sup><br>68977-1 <sup>i</sup> | 64770-16 <sup>j</sup><br>64771-16 <sup>k</sup> |   | 64790-1 <sup>l</sup><br>64791-1 <sup>m</sup> |
|                                | 99890-16 <sup>c</sup><br>99832-16 <sup>c,d</sup> | 99970-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>c</sup> |                  | 64628-16 <sup>f</sup><br>64629-16 <sup>g</sup> | 68975-1 <sup>h</sup><br>68977-1 <sup>i</sup> | 64770-16 <sup>j</sup><br>64771-16 <sup>k</sup> |   | 64790-1 <sup>l</sup><br>64791-1 <sup>m</sup> |
|                                | 99890-16 <sup>c</sup><br>99832-16 <sup>c,d</sup> | 99970-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>c</sup> |                  | 64628-16 <sup>f</sup><br>64629-16 <sup>g</sup> | 68975-1 <sup>h</sup><br>68977-1 <sup>i</sup> | 64770-16 <sup>j</sup><br>64771-16 <sup>k</sup> |   | 64790-1 <sup>l</sup><br>64791-1 <sup>m</sup> |
|                                | 99890-16 <sup>c</sup><br>99832-16 <sup>c,d</sup> | 99970-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>c</sup> |                  | 64628-16 <sup>f</sup><br>64629-16 <sup>g</sup> | 68975-1 <sup>h</sup><br>68977-1 <sup>i</sup> | 64770-16 <sup>j</sup><br>64771-16 <sup>k</sup> |   | 64790-1 <sup>l</sup><br>64791-1 <sup>m</sup> |
|                                | 99890-16 <sup>c</sup><br>99832-16 <sup>c,d</sup> | 99970-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>c</sup> |                  | 64628-16 <sup>f</sup><br>64629-16 <sup>g</sup> | 68975-1 <sup>h</sup><br>68977-1 <sup>i</sup> | 64770-16 <sup>j</sup><br>64771-16 <sup>k</sup> |   | 64790-1 <sup>l</sup><br>64791-1 <sup>m</sup> |
|                                | 99890-16 <sup>c</sup><br>99832-16 <sup>c,d</sup> | 99970-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>c</sup> |                  | 64628-16 <sup>f</sup><br>64629-16 <sup>g</sup> | 68975-1 <sup>h</sup><br>68977-1 <sup>i</sup> | 64770-16 <sup>j</sup><br>64771-16 <sup>k</sup> |   | 64790-1 <sup>l</sup><br>64791-1 <sup>m</sup> |
|                                | 99890-16 <sup>c</sup><br>99832-16 <sup>c,d</sup> | 99970-16<br>99976-16 <sup>e</sup> | 99822-16 <sup>c</sup> |                  | 64628-16 <sup>f</sup><br>64629-16 <sup>g</sup> | 68975-1 <sup>h</sup><br>68977-1 <sup>i</sup> | 64770-16 <sup>j</sup><br>64771-16 <sup>k</sup> |   | 64790-1 <sup>l</sup><br>64791-1 <sup>m</sup> |

- a Requires cam button spacer and 66990-1 aluminum-bronze distributor drive gear.
- b Vertical locking bar hydraulic roller lifters, no machining required. Special length pushrods are required, use 64628-16 (Low Block) or 64629-16 (High Block) with adjustable rocker arms.
- c Must machine cylinder heads.
- d Ovate wire beehive spring, requires 99976-16 retainers.
- e Steel, for 99832-16 beehive springs.
- f Heavy wall, heat treated, for Low Block engines with adjustable rocker arms.
- g Heavy wall, heat treated, for High Block engines with adjustable rocker arms.
- h Performance steel billet gears and roller chain set.
- i Pro Series steel billet gears and roller chain set with thrust bearing.
- j 1.5 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- k 1.6 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- l 1.5 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.
- m 1.6 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|----------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2000+ converter, 10.0 to 11.5 compression ratio advised.                         | F-238/3467-2-12                  | 2800-6600             | 681201*                                    | 99259-16 | 238  | 284   | 112                           | 12 46  | .028                        | .520                          |
|   |                                  |                       |  |          | 248  | 294   | 61 7                          | .022   | .540                        |                               |
| Good mid range torque and HP, rough idle, moderate performance usage, good mid-range HP, bracket racing, auto trans w/2500+ converter, serious off road, 10.0 to 11.5 compression ratio advised.    | F-248/3334-2-12                  | 3200-7000             | 681241*                                    | 99259-16 | 248  | 310   | 112                           | 17 51  | .022                        | .500                          |
|   |                                  |                       |  |          | 258  | 320   | 66 12                         | .022   | .520                        |                               |
| Good mid range torque and HP, rough idle, performance usage, bracket racing, auto trans w/3000+ converter, 10.5 to 12.0 compression ratio advised.  | F-248/3600-2-8                   | 3400-7000             | 680931*                                    | 99259-16 | 248  | 284   | 108                           | 21 47  | .028                        | .540                          |
|   |                                  |                       |  |          | 258  | 294   | 62 16                         | .030   | .560                        |                               |
| Good mid range and upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3000+ converter, 4000-4400 cruise RPM, 11.0 to 12.5 compression ratio advised.              | F-250/376-2S-12                  | 3600-7200             | 680941*                                    | 99259-16 | 250  | 282   | 112                           | 18 52  | .020                        | .564                          |
|   |                                  |                       |  |          | 254  | 286   | 64 10                         | .018   | .573                        |                               |
| Replacement for factory 425 HP 426 cu.in. camshaft.   | BluePrinted<br>2402293           | 3600-7200             | 680201*                                    | 99259-16 | 256  | 304   | 112.5                         | 20.5 55.5                                    | .028                        | .504                          |
|   |                                  |                       |  |          | 256  | 304   | 65.5 10.5                     | .032   | .504                        |                               |
| Good mid range and upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 11.0 to 12.5 compression ratio advised.                                    | F-258/3468-8                     | 4000-7400             | 681321*                                    | 99259-16 | 258  | 320   | 108                           | 26 52  | .022                        | .520                          |
|   |                                  |                       |  |          | 258  | 320   | 62 16                         | .022   | .520                        |                               |
| Moderate competition only, good mid and upper RPM HP, bracket racing, auto trans w/3500+ converter, 11.5 to 13.0 compression ratio advised.   | F-268/3868-2-8                   | 4600-7800             | 681561*                                    | 99259-16 | 268  | 304   | 108                           | 31 57  | .026                        | .580                          |
|   |                                  |                       |  |          | 278  | 314   | 72 26                         | .026   | .600                        |                               |
| Competition only, good upper RPM HP, bracket racing, 1-4 bbl., manual trans or auto trans w/4000+ converter, 383+ cu.in., 12.0 minimum compression ratio advised.                                   | F-274/3933-8                     | 4800-8000             | 681681*                                    | 99259-16 | 274  | 314   | 108                           | 34 60  | .028                        | .590                          |
|   |                                  |                       |  |          | 274  | 314   | 70 24                         | .028   | .590                        |                               |
| Competition only, good upper RPM HP, bracket racing, manual trans or auto trans w/4000+ converter, 440+ cu.in., 12.0 minimum compression ratio advised.   | F-278/4002-8                     | 5000-8200             | 681701*                                    | 99259-16 | 278  | 314   | 108                           | 34 64  | .026                        | .600                          |
|   |                                  |                       |  |          | 278  | 314   | 70 28                         | .026   | .600                        |                               |
| Competition only, good upper RPM HP, bracket racing, aftermarket aluminum cylinder heads advised, manual trans or auto trans w/race converter, 470+ cu.in., 13.0 minimum compression ratio advised. | F-280/430-10                     | 5000-8400             | 681721*                                    | 99259-16 | 280  | 320   | 110                           | 33 67  | .018                        | .645                          |
|   |                                  |                       |  |          | 280  | 320   | 73 27                         | .018   | .645                        |                               |
| Radical competition only, maximum performance applications, flat tappet restricted classes, 1-4 bbl., manual trans or auto trans w/race converter, 13.0 minimum minimum compression ratio advised.  | F-288/4134-6                     | 5200-8400             | 681941*                                    | 99259-16 | 288  | 324   | 106                           | 42 66  | .026                        | .620                          |
|   |                                  |                       |  |          | 288  | 324   | 74 34                         | .026   | .620                        |                               |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.  
NOTE: These three-bolt camshafts can be used in engines originally equipped with single-bolt camshafts if the appropriate timing chain and gear assembly, 68975-1 or 68977-1 is used.

NOTE: Camshafts for Chrysler Mega Blocks with 47 degree lifter bore bank angles, and aftermarket blocks with 48 degree lifter bore bank angles are available on special order.  
NOTE: To provide for valve adjustment on mechanical lifter camshafts, the use of our 64770-16 or 64790-1 adjustable rocker arms and 64621-16 (low block) or 64622-16 (high

block) pushrods is highly recommended.  
NOTE: Adjustable rocker arms and appropriate pushrods are required for use with mechanical lifter camshafts.  
NOTE: Low Block Engines are 350-361-383-400 cu.in., while High Block Engines are 413-426-440 cu.in.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360      | See pg. 306                                    | See pg. 328                                  | See pg. 312                                    | See pg. 315  | See pg. 320                                  |
|--------------------------------|-----------------------|-------------|-----------------------|------------------|--|--|--|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | CAST ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/ ENERGIZER GOLD RACE |  |
|                                | 99890-16 <sup>a</sup> | 99970-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 68975-1 <sup>d</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |
|                                | 99890-16 <sup>a</sup> | 99970-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 68975-1 <sup>d</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |
|                                | 99890-16 <sup>a</sup> | 99970-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 68975-1 <sup>d</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |
|                                | 99890-16 <sup>a</sup> | 99970-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 68975-1 <sup>d</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |
|                                | 99893-16 <sup>a</sup> | 99954-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 64975-1 <sup>i</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |
|                                | 99890-16 <sup>a</sup> | 99970-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 68975-1 <sup>d</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |
|                                | 99890-16 <sup>a</sup> | 99970-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 68975-1 <sup>d</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |
|                                | 99890-16 <sup>a</sup> | 99970-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 68975-1 <sup>d</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |
|                                | 99890-16 <sup>a</sup> | 99970-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 68975-1 <sup>d</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |
|                                | 99890-16 <sup>a</sup> | 99970-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 68975-1 <sup>d</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |
|                                | 99890-16 <sup>a</sup> | 99970-16    | 99822-16 <sup>a</sup> |                  | 64621-16 <sup>b</sup><br>64622-16 <sup>c</sup> | 68975-1 <sup>d</sup><br>68977-1 <sup>e</sup> | 64770-16 <sup>f</sup><br>64771-16 <sup>g</sup> |  | 64790-1 <sup>h</sup><br>64791-1 <sup>i</sup> |

- a Must machine cylinder heads.
- b Heavy wall, heat treated, for Low Block engines with adjustable rocker arms.
- c Heavy wall, heat treated, for High Block engines with adjustable rocker arms.
- d Performance steel billet gears and roller chain set.
- e Pro Series steel billet gears and roller chain set with thrust bearing.
- f 1.5 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- g 1.6 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- h 1.5 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.
- i 1.6 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                           | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| Excellent mid range torque and HP, fair idle, moderate performance usage, off road, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 10.5 to 11.5 compression ratio advised.  | SR-246/362-2S-12                 | 3200-7200             | 688521 <sup>a</sup>                        | 66515-16<br>66542-16 <sup>b</sup> | 246  | 296   | 112                           | 16 50  | .020                        | .543                          |
|   |                                  |                       |  |                                   | 254  | 304   | 64 10                         | .020   | .561                        |                               |
| Good mid range to upper RPM torque and HP, rough idle, moderate performance usage, mild bracket racing, auto trans w/3500+ converter, 4000-4400 cruise RPM, good w/plate nitrous system, 11.0 to 12.0 compression ratio advised.                  | SR-254/374-2S-12                 | 3400-7200             | 688531 <sup>a</sup>                        | 66515-16<br>66542-16 <sup>b</sup> | 254  | 304   | 112                           | 20 54  | .020                        | .561                          |
|   |                                  |                       |  |                                   | 258  | 308   | 66 12                         | .020   | .561                        |                               |
| Good mid range and upper RPM torque and HP, rough idle, performance usage, oval track, bracket racing, auto trans w/3500+ converter, 11.5 to 13.0 compression ratio advised.  | R-260/420-2S-8                   | 3800-7600             | 688801 <sup>a</sup>                        | 66542-16 <sup>b</sup>             | 260  | 292   | 108                           | 26 54  | .020                        | .630                          |
|   |                                  |                       |  |                                   | 268  | 300   | 66 22                         | .020   | .630                        |                               |
| Good upper RPM torque and HP, moderate competition only, bracket racing, auto trans w/race converter, 12.0 minimum compression ratio advised.   | R-268/420-2-8                    | 4000-7800             | 688811 <sup>a</sup>                        | 66542-16 <sup>b</sup>             | 268  | 300   | 108                           | 30 58  | .020                        | .630                          |
|   |                                  |                       |  |                                   | 278  | 310   | 71 27                         | .020   | .630                        |                               |
| Competition only, good upper RPM HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.   | R-272/420-2-10                   | 4200-8000             | 688821 <sup>a</sup>                        | 66542-16 <sup>b</sup>             | 272  | 304   | 108                           | 30 62  | .020                        | .630                          |
|   |                                  |                       |  |                                   | 282  | 314   | 75 27                         | .022   | .630                        |                               |
| Competition only, good mid to upper RPM torque and HP, 440+ cu.in., bracket racing, auto trans w/race converter, good with plate or manifold nitrous system, aluminum aftermarket cylinder heads advised, 12.5 minimum compression ratio advised. | R-274/454-2S-12                  | 4400-8200             | 688651 <sup>a</sup>                        | 66542-16 <sup>b</sup>             | 274  | 306   | 112                           | 29 65  | .020                        | .681                          |
|   |                                  |                       |  |                                   | 278  | 310   | 75 23                         | .022   | .693                        |                               |
| Competition only, good upper RPM HP, 440+ cu.in., bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.  | R-276/420-2-10                   | 4400-8400             | 688831 <sup>a</sup>                        | 66542-16 <sup>b</sup>             | 276  | 308   | 110                           | 32 64  | .020                        | .630                          |
|   |                                  |                       |  |                                   | 286  | 318   | 77 29                         | .020   | .630                        |                               |
| Competition only, single 4-barrel, Super Stock 383-400 cu.in., auto trans w/race converter, 11.5 minimum compression ratio advised.   | R-280/4468-8                     | 4600-8200             | 688981 <sup>a</sup>                        | 66542-16 <sup>b</sup>             | 280  | 312   | 108                           | 37 63  | .028                        | .670                          |
|   |                                  |                       |  |                                   | 280  | 312   | 73 27                         | .030   | .670                        |                               |
| Competition only, Super Street, Super Gas, Pro E.T., auto trans w/race converter, aftermarket aluminum cylinder heads advised, 13.0 minimum compression ratio advised.  | R-280/450-2S4-10                 | 4600-8400             | 688681 <sup>a</sup>                        | 66542-16 <sup>b</sup>             | 280  | 320   | 114                           | 33 67  | .026                        | .675                          |
|   |                                  |                       |  |                                   | 288  | 328   | 77 31                         | .026   | .638                        |                               |
| Competition only, good upper RPM HP, 470+ cu.in., bracket racing, auto trans w/race converter, 13.0 minimum compression ratio advised.  | R-282/420-2-10                   | 4800-8600             | 688841 <sup>a</sup>                        | 66542-16 <sup>b</sup>             | 282  | 314   | 110                           | 35 67  | .020                        | .630                          |
|   |                                  |                       |  |                                   | 292  | 324   | 80 32                         | .020   | .630                        |                               |
| Competition only, Super Stock drags 426 cu.in., 11.5 minimum compression ratio advised.   | R-284/456-6                      | 5000-8200             | 688561 <sup>a</sup>                        | 66542-16 <sup>b</sup>             | 284  | 324   | 106                           | 38 66  | .026                        | .684                          |
|   |                                  |                       |  |                                   | 284  | 324   | 70 34                         | .026   | .684                        |                               |
| Radical competition only, maximum performance applications, Top Dragster, Top Sportsman, Quick 16, etc., 560+ cu.in., aftermarket aluminum cylinder heads required, good w/large manifold nitrous system.   | R-286/500-2S3-14                 | 5000-8400             | 688671 <sup>a</sup>                        | 66542-16 <sup>b</sup>             | 286  | 320   | 114                           | 32 74  | .026                        | .750                          |
|   |                                  |                       |  |                                   | 306  | 338   | 92 34                         | .022   | .750                        |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

NOTE: These three-bolt camshafts can be used in engines originally equipped with single-bolt camshafts if the appropriate timing chain and gear assembly, 68975-1 or 68977-1 is used.

NOTE: Camshafts for Chrysler Mega Blocks with 47 degree lifter bore bank angles, and aftermarket blocks with 48 degree lifter bore bank angles are available on special order.

NOTE: Adjustable rocker arms and appropriate pushrods are required for use with roller lifter camshafts. To provide for valve adjustment on roller lifter camshafts, the use of our 64770-16 or 64790-1 adjustable rocker arms and 64621-16 (low block) or 64622-16 (high block) pushrods is highly recommended.

NOTE: Low Block Engines are 350-361-383-400 cu.in., while High Block Engines are 413-426-440 cu.in.

NOTE: For engines equipped with B-1 cylinder heads, the fourth cam bearing journal must be grooved for proper oiling. Labor operation 98088 is an available option for this service.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                       | See pg. 350                                    | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                                  | See pg. 312                                    | See pg. 315   | See pg. 320                                  |
|--------------------------------|---|--|-----------------------|--|--|--|--|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                     | RETAINERS                                      | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | CAST ROCKER ARMS                               | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                    |
|                                | 96879-16 <sup>c</sup><br>99832-16 <sup>c,d</sup>  | 99970-16<br>99976-16 <sup>f</sup>              | 99822-16 <sup>c</sup> | 99098-1 <sup>j</sup>                         | 64621-16 <sup>m</sup><br>64622-16 <sup>n</sup> | 68975-1 <sup>o</sup><br>68977-1 <sup>p</sup> | 64770-16 <sup>q</sup><br>64771-16 <sup>r</sup> |   | 64790-1 <sup>s</sup><br>64791-1 <sup>t</sup> |
|                                | 96879-16 <sup>c</sup><br>99832-16 <sup>b,c</sup>  | 99970-16<br>99976-16 <sup>a</sup>              | 99822-16 <sup>c</sup> | 99098-1 <sup>j</sup>                         | 64621-16 <sup>m</sup><br>64622-16 <sup>n</sup> | 68975-1 <sup>o</sup><br>68977-1 <sup>p</sup> | 64770-16 <sup>q</sup><br>64771-16 <sup>r</sup> |   | 64790-1 <sup>s</sup><br>64791-1 <sup>t</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99955-16                                       | 99822-16 <sup>c</sup> | 99098-1 <sup>j</sup>                         | 64621-16 <sup>m</sup><br>64622-16 <sup>n</sup> | 68975-1 <sup>o</sup><br>68977-1 <sup>p</sup> | 64770-16 <sup>q</sup><br>64771-16 <sup>r</sup> |   | 64790-1 <sup>s</sup><br>64791-1 <sup>t</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99955-16                                       | 99822-16 <sup>c</sup> | 99098-1 <sup>j</sup>                         | 64621-16 <sup>m</sup><br>64622-16 <sup>n</sup> | 68975-1 <sup>o</sup><br>68977-1 <sup>p</sup> | 64770-16 <sup>q</sup><br>64771-16 <sup>r</sup> |   | 64790-1 <sup>s</sup><br>64791-1 <sup>t</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99955-16                                       | 99822-16 <sup>c</sup> | 99098-1 <sup>j</sup>                         | 64621-16 <sup>m</sup><br>64622-16 <sup>n</sup> | 68975-1 <sup>o</sup><br>68977-1 <sup>p</sup> | 64770-16 <sup>q</sup><br>64771-16 <sup>r</sup> |   | 64790-1 <sup>s</sup><br>64791-1 <sup>t</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99955-16<br>99681-16 <sup>g</sup>              | 99822-16 <sup>c</sup> | 99098-1 <sup>j</sup>                         | 64621-16 <sup>m</sup><br>64622-16 <sup>n</sup> | 68975-1 <sup>o</sup><br>68977-1 <sup>p</sup> | 64770-16 <sup>q</sup><br>64771-16 <sup>r</sup> |   | 64790-1 <sup>s</sup><br>64791-1 <sup>t</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99955-16<br>99681-16 <sup>g</sup>              | 99822-16 <sup>c</sup> | 99098-1 <sup>j</sup>                         | 64621-16 <sup>m</sup><br>64622-16 <sup>n</sup> | 68975-1 <sup>o</sup><br>68977-1 <sup>p</sup> | 64770-16 <sup>q</sup><br>64771-16 <sup>r</sup> |   | 64790-1 <sup>s</sup><br>64791-1 <sup>t</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99955-16<br>99681-16 <sup>g</sup>              | 99822-16 <sup>c</sup> | 99098-1 <sup>j</sup>                         | 64621-16 <sup>m</sup><br>64622-16 <sup>n</sup> | 68975-1 <sup>o</sup><br>68977-1 <sup>p</sup> | 64770-16 <sup>q</sup><br>64771-16 <sup>r</sup> |   | 64790-1 <sup>s</sup><br>64791-1 <sup>t</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99955-16<br>99681-16 <sup>g</sup>              | 99822-16 <sup>c</sup> | 99098-1 <sup>j</sup>                         | 64621-16 <sup>m</sup><br>64622-16 <sup>n</sup> | 68975-1 <sup>o</sup><br>68977-1 <sup>p</sup> | 64770-16 <sup>q</sup><br>64771-16 <sup>r</sup> |   | 64790-1 <sup>s</sup><br>64791-1 <sup>t</sup> |
|                                | 96886-16 <sup>c</sup><br>961246-16 <sup>c,e</sup> | 99634-16 <sup>h</sup><br>99962-16 <sup>i</sup> | 99828-16 <sup>c</sup> | 99081-1 <sup>k</sup><br>99082-1 <sup>l</sup> | 64621-16 <sup>m</sup><br>64622-16 <sup>n</sup> | 68975-1 <sup>o</sup><br>68977-1 <sup>p</sup> | 64770-16 <sup>q</sup><br>64771-16 <sup>r</sup> |   | 64790-1 <sup>s</sup><br>64791-1 <sup>t</sup> |

- a Requires cam button spacer and 66990-1 aluminum-bronze distributor drive gear.
- b Ultra Pro Series roller lifters.
- c Must machine cylinder heads.
- d Ovate wire beehive spring, requires 99976-16 retainers.
- e Triple, for 2.050" assembly height, requires 99662-16 retainers.
- f Steel, for 99832-16 beehive springs.
- g Titanium, Posi Stop, must use 99098-1 single groove valve stem locks, included with the retainers.
- h Titanium, standard 10 degree configuration.
- i Titanium, for 961246-16 valve springs.
- j Machined steel Heat treated, single groove.
- k Machined steel, heat treated, 10 degree for 11/32" single groove valve stems.
- l Machined steel, heat treated, 10 degree for 3/8" single groove valve stems.
- m Heavy wall, heat treated, for Low-Block engines with adjustable rocker arms.
- n Heavy wall, heat treated, for High-Block engines with adjustable rocker arms.
- o Performance steel billet gears and roller chain set.
- p Pro Series steel billet gears and roller chain set with thrust bearing.
- q 1.5 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- r 1.6 ratio iron rocker arms, adjustable, must use appropriate Crane pushrods (shafts not included).
- s 1.5 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.
- t 1.6 ratio aluminum rocker arm kit with rocker shafts, adjustable, must use appropriate Crane pushrods.

# Chrysler-Dodge-Plymouth V-8 "Hemi 426" 66-71

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>   |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Excellent low end torque, good idle, daily usage, 2600-3000 cruise RPM, 8.5 to 10.25 compression ratio advised.   | H-212/304-2-12                   | 1600-5200             | 660091*                                    | 99278-16              | 212<br>222                                 | 284<br>294                                    | 112                           | (1) 33<br>48 (6)                             | .000<br>.000                | .477<br>.486                  |
| Great mid range torque and HP, street Hemi and Crate Motor upgrade, fair idle, mild bracket racing, auto trans w/2500+ converter, 3800-4200 cruise RPM, 10.0 to 11.5 compression ratio advised.   | H-232/3360-2-12                  | 2600-6000             | 660611*                                    | 99278-16              | 232<br>242                                 | 304<br>314                                    | 112                           | 9 43<br>58 4                                 | .000<br>.000                | .528<br>.535                  |
| Good mid range torque and HP, street Hemi and Crate Motor upgrade, fair idle, mild bracket racing, good w/472+ cu.in., auto trans w/3000+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised.  | H-236/348-2S-12                  | 2800-6200             | 660621*                                    | 99278-16              | 236<br>244                                 | 292<br>300                                    | 112                           | 11 45<br>59 5                                | .000<br>.000                | .546<br>.550                  |
| Rough idle, performance usage, good upper RPM HP, bracket racing, auto trans w/3500+ converter, 4000-4400 cruise RPM, 11.0 to 12.5 compression ratio advised. Also good w/ supercharger, 18 lbs. maximum boost w/8.5 maximum compression ratio advised.           | H-244/362-2S-14                  | 3200-6600             | 660631*                                    | 99278-16              | 244<br>252                                 | 300<br>308                                    | 114                           | 13 51<br>65 7                                | .000<br>.000                | .568<br>.572                  |
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Great mid range torque and HP, fair idle, mild bracket racing, auto trans w/2500+ converter, 3000-3400 cruise RPM, 9.5 to 11.0 compression ratio advised.   | HR-226/345-2S1-12                | 2200-6200             | 669521* <sup>a</sup>                       | 68532-16 <sup>b</sup> | 226<br>230                                 | 288<br>292                                    | 112                           | 6 40<br>52 (2)                               | .000<br>.000                | .542<br>.535                  |
| Good mid range torque and HP, street Hemi and Crate Motor upgrade, fair idle, mild bracket racing, auto trans w/3000+ converter, 3400-3800 cruise RPM, 10.0 to 11.5 compression ratio advised.  | HR-236/359-2S-12                 | 2600-6600             | 669531* <sup>a</sup>                       | 68532-16 <sup>b</sup> | 236<br>240                                 | 298<br>302                                    | 112                           | 6 40<br>52 (2)                               | .000<br>.000                | .564<br>.555                  |
| Crate Motor upgrade, rough idle, performance usage, good upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised, supercharged and/or nitrous.  | HR-244/372-2S-14                 | 3000-6800             | 669541* <sup>a</sup>                       | 68532-16 <sup>b</sup> | 244<br>248                                 | 306<br>310                                    | 114                           | 13 51<br>63 5                                | .000<br>.000                | .584<br>.565                  |
| Performance usage, good upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, good w/472+ cu.in., good w/large nitrous system, 11.5 minimum compression ratio advised. Also supercharged, 22 lbs. maximum boost w/8.5 maximum compression ratio. | HR-254/400-2S-14                 | 3400-7000             | 669571* <sup>a</sup>                       | 68532-16 <sup>b</sup> | 254<br>258                                 | 324<br>328                                    | 114                           | 17.5 56.5<br>68 10                           | .000<br>.000                | .628<br>.608                  |
| Performance usage, good upper RPM HP, bracket racing, auto trans w/race converter, good w/496+ cu.in., good w/large nitrous system, 12.5 minimum compression ratio advised. Also supercharged, 28 lbs. maximum boost w/8.5 maximum compression ratio.             | HR-262/400-2S-14                 | 3600-7000             | 669561* <sup>a</sup>                       | 68532-16 <sup>b</sup> | 262<br>266                                 | 332<br>336                                    | 114                           | 21.5 60.5<br>72 14                           | .000<br>.000                | .628<br>.608                  |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**  
**IMPORTANT:** Due to the increased pushrod seat height of the Crane retrofit hydraulic roller lifters, the cylinder heads, and possibly the cylinder block, will have to be modified for pushrod clearance.

**NOTE:** Recently produced iron cylinder blocks may have taller than standard lifter bores. This may cause roller lifter guidebar interference, preventing the lifters from contacting the base circle of the camshaft. This will require clearancing, usually by grinding the block. This should be checked prior to final engine assembly.

**NOTE:** Camshafts for Chrysler Mega Blocks with 50 degree lifter bore bank angles, and aftermarket blocks with 48 degree lifter bore bank angles are available on special order.

CAMSHAFTS

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350           | See pg. 362           | See pg. 360          | See pg. 306           | See pg. 328                                  | See pg. 312      | See pg. 315   | See pg. 317 |
|--------------------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|--|------------------|---|-------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS             | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY               | CAST ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
|                                | 99893-16              | 99954-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 66621-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 99893-16              | 99954-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 66621-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 99893-16              | 99954-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 66621-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 99893-16              | 99954-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 66621-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 99896-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 66628-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 99896-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 66628-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 99896-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 66628-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 99896-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 66628-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 99896-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 66628-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |

**a** Requires cam button spacer and **66990-1** aluminum-bronze distributor drive gear.  
**b** Vertical locking bar hydraulic roller lifters, machining possibly required (see **IMPORTANT NOTE** on opposite page). Special length pushrods are required, use **66628-16**.  
**c** Must machine cylinder heads.  
**d** Requires Crane Multi-Fit valve locks.  
**e** Machined steel, heat treated, Multi-Fit.  
**f** Heavy wall, heat treated.  
**g** Performance steel billet gears and roller chain set.  
**h** Pro Series steel billet gears and roller chain set with thrust bearing.

# Chrysler-Dodge-Plymouth V-8 "Hemi 426" 66-71

Also: Brad Anderson aluminum, Johnson/Rodeck TFX-92, Keith Black aluminum, Milodon VII litre, and JP-1

## COMPLETE CAM SPECIFICATIONS

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | See pg. 293<br>LIFTERS            | Degrees                         | Advertised                      | Degrees            | Open/Close                      | Lash                | Gross                |
|---|----------------------------------|-----------------------|--|-----------------------------------|---------------------------------|---------------------------------|--------------------|---------------------------------|---------------------|----------------------|
|   |                                  |                       |  |                                   | Duration<br>@ .050"<br>Int/Exh. | Degrees<br>Duration<br>Int/Exh. | Lobe<br>Separation | @ .050"<br>Cam Lift<br>Int/Exh. | Hot<br>Int.<br>Exh. | Lift<br>Int.<br>Exh. |
| <b>Mechanical Lifter Camshafts</b>  |                                  |                       |  |                                   |                                 |                                 |                    |                                 |                     |                      |
| Good low and mid range torque, street Hemi, fair idle, moderate performance usage, bracket racing, auto trans w/3000+ converter, 3600-4000 cruise RPM, 10.0 to 11.5 compression ratio advised.  | F-238/3200-2-12                  | 2800-6400             | 661201*                                    | 99259-16                          | 238                             | 300                             | 112                | 12 46                           | .022                | .502                 |
|   |                                  |                       |  |                                   | 248                             | 310                             | 61 7               | .022                            | .507                |                      |
| Good mid range torque and HP, Crate Motor upgrade, rough idle, moderate performance usage, bracket racing, auto trans w/3500+ converter, 10.5 to 12.0 compression ratio advised. Also mild supercharged and/or nitrous.                                       | F-248/3600-2-12                  | 3600-7000             | 660941*                                    | 99259-16                          | 248                             | 294                             | 112                | 17 52                           | .028                | .565                 |
|   |                                  |                       |  |                                   | 258                             | 304                             | 66 12              | .030                            | .568                |                      |
| Rough idle, moderate performance usage, bracket racing, auto trans w/4000+ converter, 11.5 to 13.0 compression ratio advised. Also mild supercharged and/or nitrous.  | F-260/391-25-10                  | 4000-7200             | 661381*                                    | 99259-16                          | 260                             | 292                             | 110                | 25 55                           | .018                | .614                 |
|   |                                  |                       |  |                                   | 264                             | 296                             | 67 17              | .018                            | .603                |                      |
| <b>Mechanical Roller Camshafts</b>  |                                  |                       |  |                                   |                                 |                                 |                    |                                 |                     |                      |
| Good low end and mid range torque and HP, Crate Motor upgrade, good idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3200-3600 cruise RPM, 10.0 to 11.5 compression ratio advised. Also mild supercharged and/or nitrous. | SR-238/350-25-12                 | 3000-7000             | 668511* <sup>a</sup>                       | 66515-16<br>66542-16 <sup>b</sup> | 238                             | 288                             | 112                | 42 46                           | .020                | .550                 |
|   |                                  |                       |  |                                   | 246                             | 296                             | 60 6               | .020                            | .550                |                      |
| Good mid range torque and HP, Crate Motor upgrade, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 10.5 to 11.5 compression ratio advised. Also mild supercharged and/or nitrous.             | SR-246/362-25-12                 | 3200-7200             | 668521* <sup>a</sup>                       | 66515-16<br>66542-16 <sup>b</sup> | 246                             | 296                             | 112                | 16 50                           | .020                | .568                 |
|   |                                  |                       |  |                                   | 254                             | 304                             | 64 10              | .020                            | .568                |                      |
| Good mid range and upper RPM torque and HP, rough idle, mild bracket racing, auto trans w/3000+ converter, 11.0 to 12.5 compression ratio advised. Also mild supercharged and/or nitrous.   | SR-254/374-25-12                 | 3600-7600             | 668531* <sup>a</sup>                       | 66515-16<br>66542-16 <sup>b</sup> | 254                             | 304                             | 112                | 20 54                           | .020                | .587                 |
|   |                                  |                       |  |                                   | 262                             | 312                             | 68 14              | .020                            | .565                |                      |
| Performance usage, Pro Street, mild bracket racing, auto trans w/race converter, 12.0 to 13.5 compression ratio advised. Also mild supercharged and/or nitrous.   | SR-262/400-25-12                 | 3800-7600             | 668541* <sup>a</sup>                       | 66515-16<br>66542-16 <sup>b</sup> | 262                             | 300                             | 112                | 24 58                           | .020                | .628                 |
|   |                                  |                       |  |                                   | 266                             | 304                             | 70 16              | .020                            | .608                |                      |
| Performance usage, bracket racing, auto trans w/race converter, good w/large nitrous system, 12.0 to 13.5 compression ratio advised. Also supercharged w/22 lbs. maximum boost w/8.5 maximum compression ratio.   | R-262/452-25-12                  | 4000-7800             | 668301* <sup>a</sup>                       | 66515-16<br>66542-16 <sup>b</sup> | 262                             | 291                             | 112                | 24 58                           | .020                | .710                 |
|   |                                  |                       |  |                                   | 276                             | 312                             | 73 23              | .020                            | .699                |                      |
| Competition only, bracket racing w/heavy car, single 4 bbl, auto trans w/race converter, 12.0 to 13.5 compression ratio advised.  | R-274/4334-8                     | 4400-8000             | 668281* <sup>a</sup>                       | 66515-16<br>66542-16 <sup>b</sup> | 274                             | 314                             | 108                | 32 62                           | .026                | .680                 |
|   |                                  |                       |  |                                   | 274                             | 314                             | 68 26              | .026                            | .659                |                      |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**NOTE:** Recently produced iron cylinder blocks may have taller than standard lifter bores, causing roller lifter guidebar interference, preventing the lifters from contacting the base circle of the camshaft. This will require clearancing, usually by grinding the block. You must check for this prior to final engine assembly.

**NOTE:** Camshafts for Chrysler Mega Blocks with 50 degree lifter bore bank angles, and aftermarket blocks with 48 degree lifter bore bank angles are available on special order.

**NOTE:** Roller camshafts for the Keith Black 48°, Brad Anderson, and Johnson/Rodeck TFX-92 engines, with either standard, 2.125" or 60mm cam bearing journals, are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Roller camshafts for the 2.125" 1-4 journal diameter configuration and those having 60mm journals are available with the 4/7 firing order swap (1-8-7-3-6-5-4-2).

**NOTE:** Custom ground tool steel roller camshafts are available for the 2.125" 1-4 journal diameter, and the 60mm journal diameter configuration blocks.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350           | See pg. 362           | See pg. 360          | See pg. 306           | See pg. 328                                  | See pg. 312      | See pg. 315   | See pg. 317 |
|--------------------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|--|------------------|---|-------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS             | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY               | CAST ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
|                                | 99893-16              | 99954-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 65689-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 99893-16              | 99954-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 65689-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 99893-16              | 99954-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99093-1 <sup>e</sup> | 65689-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 96878-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99085-1 <sup>e</sup> | 65689-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 96878-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99085-1 <sup>e</sup> | 65689-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 96878-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99085-1 <sup>e</sup> | 65689-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 96878-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99085-1 <sup>e</sup> | 65689-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 96886-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99085-1 <sup>e</sup> | 65689-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |
|                                | 96886-16 <sup>c</sup> | 99970-16 <sup>d</sup> | 99824-16 <sup>c</sup> | 99085-1 <sup>e</sup> | 65689-16 <sup>f</sup> | 68975-1 <sup>g</sup><br>68977-1 <sup>h</sup> |                  |   |             |

**Section Continued**

- a** Requires cam button spacer and 66990-1 aluminum-bronze distributor drive gear.
- b** Ultra Pro Series roller lifters.
- c** Must machine cylinder heads.
- d** Requires Crane Multi-Fit valve locks.
- e** Machined steel, heat treated, Multi-Fit.
- f** Heavy wall, heat treated.
- g** Performance steel billet gears and roller chain set.
- h** Pro Series steel billet gears and roller chain set with thrust bearing.

# Chrysler-Dodge-Plymouth V-8 "Hemi 426" 66-71

Also: Brad Anderson aluminum, Johnson/Rodeck TFX-92, Keith Black aluminum, Milodon VII litre, and JP-1

## COMPLETE CAM SPECIFICATIONS

| Application   | Camshaft Series/<br>Grind Number                          | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code                                | See pg. 296<br>LIFTERS                         | Degrees             | Advertised           | Degrees            | Open/Close                     | Lash                | Gross                |
|---|---|-----------------------|---|--|---------------------|----------------------|--------------------|--------------------------------|---------------------|----------------------|
|   |   |                       |   |  | Duration<br>@ .050" | Duration<br>Int/Exh. | Lobe<br>Separation | @ .050"<br>Cam Lift<br>Int/Exh | Hot<br>Int.<br>Exh. | Lift<br>Int.<br>Exh. |
| <b>Mechanical Roller Camshafts</b>  |   |                       |   |  |                     |                      |                    |                                |                     |                      |
| Competition only, NHRA A/FD.  | R-276/5401-2S-13XBBA 48D                                  | 4000-6800             | 668821 <sup>a,b,c</sup>   | 66547-16 <sup>e</sup>                          | 276<br>282          | 305<br>311           | 113                | 25 71<br>74 28                 | .020<br>.022        | .848<br>.821         |
| Competition only, serious race Super Stock w/2-4s, SFO (1-8-7-3-6-5-4-2) firing order.  | R-276/555-2S-13XBBA SFO                                   | 5500-8500             | 668351 <sup>a,b,d</sup>   | 66542-16 <sup>f</sup>                          | 276<br>294          | 306<br>324           | 113                | 26 70<br>82 32                 | .020<br>.022        | .871<br>.798         |
| Competition only, drag racing single 4-barrel Super Stock, manual or auto trans w/race converter, 12.0 minimum compression ratio advised. | 320-324-12R   | 4400-8400             | 668951 <sup>a</sup>   | 66542-16 <sup>f</sup>                          | 284<br>286          | 320<br>324           | 112                | 32 72<br>77 29                 | .028<br>.030        | .785<br>.760         |
| Competition only, Nostalgia F/C.  | R-292/480-10XBBA 48D                                      | 5000-8500             | 668311 <sup>a,b,c</sup>   | 66547-16 <sup>e</sup>                          | 292<br>292          | 332<br>332           | 110                | 36 76<br>76 36                 | .026<br>.026        | .754<br>.730         |
| Competition only, Nostalgia A/GS.   | R-292/500-2S4-14XBBA 48D                                  | 5500-9500             | 668321 <sup>a,b,c</sup>   | 66542-16 <sup>f</sup><br>95542-16 <sup>g</sup> | 292<br>296          | 332<br>336           | 114                | 35 77<br>85 31                 | .026<br>.026        | .785<br>.760         |
| Competition only, maximum performance, baseline high RPM normally aspirated applications, 12.5 minimum compression ratio advised.         | R-296/4778-8  | 4600-8600             | 669091 <sup>a</sup>   | 66542-16 <sup>f</sup>                          | 296<br>296          | 328<br>328           | 108                | 42 74<br>78 38                 | .024<br>.026        | .750<br>.726         |
| Competition only, supercharged alcohol dragster up to 480 cu.in.  | R-296/4778-2S-14<br>R-296/4778-2S-14XBBA 48D              | 6000-10000            | 669101 <sup>a</sup><br>669161 <sup>a,b,c</sup>                            | 66542-16 <sup>f</sup><br>95542-16 <sup>g</sup> | 296<br>300          | 328<br>322           | 114                | 39 77<br>89 31                 | .024<br>.026        | .750<br>.775         |
| Competition only, supercharged alcohol funny car over 480 cu.in.  | R-296/500-16<br>R-296/500-16 48D<br>R-296/500-16 XBBA 48D | 6000-9600             | 669121 <sup>a</sup><br>669131 <sup>a,b,c</sup><br>669171 <sup>a,b,c</sup> | 66542-16 <sup>f</sup><br>95542-16 <sup>g</sup> | 296<br>296          | 336<br>336           | 116                | 35 81<br>87 29                 | .026<br>.026        | .785<br>.760         |
| Competition only, supercharged alcohol funny car over 480 cu.in., Pro Mod, with rigid valve train, SFO (1-8-7-3-6-5-4-2) firing order.    | R-296/5001-16XBBA 48D SFO                                 | 6000-9600             | 668331 <sup>a,b,c,d</sup>   | 66542-16 <sup>f</sup><br>95542-16 <sup>g</sup> | 296<br>296          | 330<br>330           | 116                | 36 80<br>88 28                 | .020<br>.022        | .785<br>.760         |
| Competition only, baseline supercharged Fuel Dragster or Funny Car, and Blown Fuel Hydro.   | R-298/4778-14XBBA 48D                                     | 5000-8600             | 669181 <sup>a,b,c</sup>   | 66549-16 <sup>h</sup>                          | 298<br>298          | 330<br>330           | 114                | 37 81<br>85 33                 | .026<br>.026        | .750<br>.726         |
| Competition only, Top Fuel Dragster and Funny Car.  | R-302/500-2SR-14XBBA 48D                                  | 5000-8600             | 668341 <sup>a,b,c</sup>   | 66549-16 <sup>h</sup>                          | 302<br>298          | 342<br>338           | 114                | 37 85<br>83 35                 | .026<br>.026        | .785<br>.760         |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**NOTE:** Recently produced iron cylinder blocks may have taller than standard lifter bores, causing roller lifter guidebar interference, preventing the lifters from contacting the base circle of the camshaft. This will require clearancing, usually by grinding the block. you must check for this prior to final engine assembly.

**NOTE:** Camshafts for Chrysler Mega Blocks with 50 degree lifter bore bank angles, and aftermarket blocks with 48 degree lifter bore bank angles are available on special order.

**NOTE:** Camshafts for the Keith Black 48°, Brad Anderson, and Johnson/Rodeck TFX-92 engines, with either standard, 2.125" or 60mm cam bearing journals, are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** Camshafts for the 2.125" 1-4 journal diameter configuration and those having 60mm journals are available with the 4/7 firing order swap (1-8-7-3-6-5-4-2).

**NOTE:** Custom ground tool steel roller camshafts are available for the 2.125" 1-4 journal diameter, and the 60mm journal diameter configuration blocks.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337  | See pg. 350   | See pg. 362                                    | See pg. 360                                    | See pg. 306 | See pg. 328                    | See pg. 312      | See pg. 315   | See pg. 317 |
|--------------------------------|--|---|--|--|-------------|--------------------------------|------------------|---|-------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS  | RETAINERS   | VALVE STEM SEALS                               | VALVE STEM LOCKS                               | PUSHRODS    | TIMING CHAIN AND GEAR ASSEMBLY | CAST ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
|                                | 96848-16 <sup>i</sup><br>961356-16 <sup>t</sup>                          | 99681-16 <sup>k</sup><br>99663-16 <sup>v</sup>                          | 99826-16 <sup>n</sup>                          | 99097-1 <sup>o</sup>                           |             |                                |                  |   |             |
|                                | 96849-16 <sup>j</sup><br>961355-16 <sup>u</sup>                          | 99656-16 <sup>l</sup><br>99663-16 <sup>v</sup>                          | 99825-16 <sup>o</sup>                          | 99093-1 <sup>o</sup> P                         |             |                                |                  |   |             |
|                                | 96848-16 <sup>i</sup><br>961356-16 <sup>t</sup>                          | 99656-16 <sup>l</sup><br>99663-16 <sup>v</sup>                          | 99825-16 <sup>o</sup>                          | 99093-1 <sup>o</sup> P                         | 66624-16    |                                |                  |   |             |
|                                | 96849-16 <sup>j</sup><br>961356-16 <sup>t</sup>                          | 99681-16 <sup>k</sup><br>99663-16 <sup>v</sup>                          | 99826-16 <sup>n</sup>                          | 99097-1 <sup>o</sup>                           |             |                                |                  |   |             |
|                                | 96849-16 <sup>j</sup><br>961355-16 <sup>u</sup>                          | 99681-16 <sup>k</sup><br>99663-16 <sup>v</sup>                          | 99826-16 <sup>n</sup>                          | 99097-1 <sup>o</sup>                           |             |                                |                  |   |             |
|                                | 96848-16 <sup>i</sup><br>961355-16 <sup>u</sup>                          | 99656-16 <sup>l</sup><br>99663-16 <sup>v</sup>                          | 99825-16 <sup>o</sup>                          | 99093-1 <sup>o</sup> P                         | 66624-16    |                                |                  |   |             |
|                                | 96848-16 <sup>i</sup><br>96849-16 <sup>j</sup><br>961355-16 <sup>u</sup> | 99681-16 <sup>k</sup><br>99663-16 <sup>v</sup>                          | 99826-16 <sup>n</sup>                          | 99097-1 <sup>o</sup>                           |             |                                |                  |   |             |
|                                | 96848-16 <sup>i</sup><br>96849-16 <sup>j</sup><br>961355-16 <sup>u</sup> | 99681-16 <sup>k</sup><br>99663-16 <sup>v</sup>                          | 99826-16 <sup>n</sup>                          | 99097-1 <sup>o</sup>                           |             |                                |                  |   |             |
|                                | 96848-16 <sup>i</sup><br>96849-16 <sup>j</sup><br>961355-16 <sup>u</sup> | 99681-16 <sup>k</sup><br>99663-16 <sup>v</sup>                          | 99826-16 <sup>n</sup>                          | 99097-1 <sup>o</sup>                           |             |                                |                  |   |             |
|                                | 96849-16 <sup>j</sup><br>961355-16 <sup>u</sup>                          | 99681-16 <sup>k</sup><br>99678-16 <sup>m</sup><br>99663-16 <sup>v</sup> | 99826-16 <sup>n</sup><br>99828-16 <sup>p</sup> | 99097-1 <sup>o</sup><br>99098-1 <sup>o</sup> Q |             |                                |                  |   |             |
|                                | 96849-16 <sup>j</sup><br>961355-16 <sup>u</sup>                          | 99681-16 <sup>k</sup><br>99678-16 <sup>m</sup><br>99663-16 <sup>v</sup> | 99826-16 <sup>n</sup><br>99828-16 <sup>p</sup> | 99097-1 <sup>o</sup><br>99098-1 <sup>o</sup> Q |             |                                |                  |   |             |

- a Requires cam button spacer and 66990-1 aluminum-bronze distributor drive gear.
- b 9310 steel camshaft with 2.125" cam bearing journals.
- c For 48° lifter bank angle blocks.
- d Camshaft has SFO firing order 1-8-7-3-6-5-4-2.
- e Ultra Pro Series 1.000" diameter roller lifters for standard to .200" spread lifter bore blocks, requires cylinder block machining.
- f Ultra Pro Series roller lifters.
- g Ultra Pro Series roller lifters for .100 to .200" spread lifter bore blocks.
- h Ultra Pro Series 1-1/16" diameter roller lifters for standard to .200" spread lifter bore blocks, requires cylinder block machining.
- i For 2.100" assembly height, cylinder head machining may be required.
- j For 2.200" assembly height, cylinder head machining may be required.
- k Titanium, for 11/32" valve stems, must use 99097-1 valve stem locks (included with the retainers) and 99421-16 lash caps.
- l Requires Crane Multi-Fit valve locks.
- m Titanium, for 3/8" valve stems, must use 99098-1 valve stem locks (included with the retainers) and 99422-16 lash caps.
- n Must machine cylinder heads.
- o For 11/32" valve stems.
- p For 5/16" valve stems.
- q For 3/8" valve stems.
- r Machined steel, heat treated.
- s Machined steel, heat treated, Multi-Fit.
- t Small diameter, low mass, Pacaloy wire for 2.100" assembly height. Requires 99963-16 titanium retainers.
- u Small diameter, low mass, Pacaloy wire for 2.175" assembly height. Requires 99963-16 titanium retainers.
- v Titanium, for 961356-16 and 961355-16 springs, requires Crane Multi Fit valve locks.

## COMPLETE CAM SPECIFICATIONS

See pg. 286

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | FOLLOWERS      | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Valve Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|---|----------------------------------|-----------------------|--|----------------|--|---|-------------------------------|--|---------------------|-----------------------|
| <b>Hydraulic Follower Camshafts</b>   |                                  |                       |  |                |  |   |                               |  |                     |                       |
| Excellent low end torque, smooth idle, upgrade for stock applications, economy, 1800-2400 cruise RPM, standard compression ratio advised.   | <b>H-260-2</b>                   | 1400-4600             | <b>190021*</b>                             | <b>19800-8</b> | 212<br>220                                 | 260<br>268                                    | 112                           | (1) 33<br>47 (7)                               | .000<br>.000        | .415<br>.425          |
|   |                                  |                       | ◆  |                |  |   |                               |  |                     |                       |
| Good low end torque, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.75 to 10.0 compression ratio advised.                             | <b>H-270</b>                     | 1400-4600             | <b>194611*</b>                             | <b>19800-8</b> | 218<br>218                                 | 270<br>270                                    | 113                           | 1 37<br>47 (9)                                 | .000<br>.000        | .415<br>.415          |
|   |                                  |                       | ◆  |                |  |   |                               |  |                     |                       |
| Good low and mid-range torque, good idle, daily usage and off road, performance and fuel efficiency, turbocharged performance, 2600-3000 cruise RPM, 9.5 to 11.0 compression ratio advised. | <b>H-272-2</b>                   | 1800-5200             | <b>194621*</b>                             | <b>19800-8</b> | 226<br>234                                 | 272<br>280                                    | 110                           | 8 38<br>52 2                                   | .000<br>.000        | .420<br>.420          |
|   |                                  |                       | ◆  |                |  |   |                               |  |                     |                       |
| Fair idle, moderate performance usage, mini stock short oval, good mid-range HP, 3000-3400 cruise RPM, 10.0 to 11.5 compression ratio advised.  | <b>H-278-2</b>                   | 2400-5600             | <b>190071*</b>                             | <b>19800-8</b> | 234<br>242                                 | 278<br>286                                    | 110                           | 12 42<br>56 6                                  | .000<br>.000        | .460<br>.480          |
|   |                                  |                       | ◆  |                |  |   |                               |  |                     |                       |
| <b>Mechanical Follower Camshafts</b>  |                                  |                       |  |                |  |   |                               |  |                     |                       |
| Moderate competition, good mid and upper RPM torque & HP, mini stock short oval, 10.0 to 11.5 compression ratio advised.  | <b>FOR-272-2-10</b>              | 2500-6000             | <b>192211*<sup>a</sup></b>                 | <b>19800-8</b> | 232<br>242                                 | 272<br>282                                    | 110                           | 11 41<br>66 6                                  | .008<br>.008        | .435<br>.460          |
|   |                                  |                       | ◆  |                |  |   |                               |  |                     |                       |
| Moderate competition only, good mid and upper RPM torque & HP, mini stock short oval, 10.5 to 12.0 compression ratio advised.   | <b>FOR-300-6</b>                 | 3200-7000             | <b>192251*<sup>a</sup></b>                 | <b>19800-8</b> | 264<br>264                                 | 300<br>300                                    | 106                           | 30 54<br>62 22                                 | .010<br>.010        | .510<br>.510          |
|   |                                  |                       | ◆  |                |  |   |                               |  |                     |                       |
| Moderate competition only, good mid and upper RPM HP, mini stock long oval, 11.0 to 12.5 compression ratio advised.   | <b>FOR-300-8</b>                 | 3400-7200             | <b>192221*<sup>a</sup></b>                 | <b>19800-8</b> | 264<br>264                                 | 300<br>300                                    | 108                           | 29 55<br>65 19                                 | .010<br>.010        | .510<br>.510          |
|   |                                  |                       | ◆  |                |  |   |                               |  |                     |                       |
| Competition only, radical turbocharged, drag racing, high RPM road course, prepared cylinder head recommended.  | <b>FOR-310-2R-8</b>              | 4200-8200             | <b>192261*<sup>a</sup></b>                 | <b>19800-8</b> | 274<br>264                                 | 310<br>300                                    | 108                           | 34 60<br>64 19                                 | .010<br>.010        | .535<br>.510          |
|   |                                  |                       | ◆  |                |  |   |                               |  |                     |                       |
| Competition only, good mid and upper RPM HP, mini stock, long oval track or road course, 12.0 minimum compression ratio advised.  | <b>FOR-310-8</b>                 | 4000-7600             | <b>192241*<sup>a</sup></b>                 | <b>19800-8</b> | 274<br>274                                 | 310<br>310                                    | 108                           | 34 60<br>70 24                                 | .010<br>.010        | .535<br>.535          |
|   |                                  |                       | ◆  |                |  |   |                               |  |                     |                       |
| Radical competition only, high RPM maximum performance applications, high boost and RPM turbocharged, 13.0 minimum compression ratio advised.   | <b>FOR-320-10</b>                | 4600-8400             | <b>192231*<sup>a</sup></b>                 | <b>19800-8</b> | 284<br>284                                 | 320<br>320                                    | 110                           | 37 67<br>77 27                                 | .010<br>.010        | .560<br>.560          |
|   |                                  |                       | ◆  |                |  |   |                               |  |                     |                       |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT NOTE:** Certain special order camshafts are not warranted against lobe wear.

**NOTE:** Although 1988 and later 2.3L and 2.5L engines are equipped with a composite steel camshaft and roller followers, conventional camshafts and followers can be fitted to them.

**NOTE:** To install mechanical type camshafts in the Ford 2300 c.c. engine, a method of effecting valve adjustment must be provided. Remove the hydraulic adjuster bodies from the cylinder head, then mill the top of the adjuster boss down .200". Machine 8 press-in sleeves from steel, approximately

1.700" long to replace the hydraulic adjusters. Drill and tap the center of each sleeve to 14mm x 1.25. The sleeves should then be pressed into the head, and secured by pinning or with a locking compound. The 71-74 Ford 2000 c.c. OHC engine's adjusters and locking nuts can then be used to provide valve adjustment. The rocker stabilizer springs from the 71-74 Ford 2000 c.c. OHC engine should also be used to maintain follower to valve stem contact.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information

1957-1958 302 Hemi V8

CRANE VALVE TRAIN COMPONENTS

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Although not usually considered to be a Chrysler Small Block, these early Chrysler Hemi engines provided the basic architecture for the "A" and "LA" engines that followed. Although visually similar, the Dodge and DeSoto hemis (and

the basic camshaft dimensions were maintained. Therefore, while A and LA camshafts will physically interchange, half of the lobes will be in the wrong location, allowing only four cylinders to run properly. The 1964-1967 273 engines were equipped with mechanical lifter cam-

that had little interchangeability with the Chrysler versions.

hydraulic lifters and non-adjustable rocker arms (with a couple of rare exceptions).

Our 53 prefix is for the 1951-1956 301-331-354 hemis, while the 54 prefix designates the 1957-1958 392 hemi.

99842-8<sup>b</sup>

To avoid premature wear of the cam lobes the proper valve train geometry must be obtained. Put machinist dye (such as Dykem Layout Fluid) on the contact surface of the rocker followers. Hand turn the camshaft and observe the wear pattern created by the lobes. The drawing below shows you the correct and incorrect pattern. If necessary, correct the valve stem length or use a lash cap to obtain the correct pattern.

MSHAF-

incorrect from bank to bank. A 392 type timing chain set will also be required when installing these camshafts in the earlier 301-354 engines.

99884-8<sup>c</sup>

99967-8

99820-8<sup>c</sup>

and heads where the pushrods pass through, due to the

smart technology can easily be applied to this half-century old powerplant.

99884-8<sup>c</sup>

99967-8

99820-8<sup>c</sup>

Mechanical roller camshafts and drop in roller lifters for

99884-8<sup>c</sup>

99967-8

99820-8<sup>c</sup>

springs, retainers, and other parts, to suit your needs.

99884-8<sup>c</sup>

99967-8

99820-8<sup>c</sup>

99884-8<sup>c</sup>

99967-8

99820-8<sup>c</sup>

This engine family is commonly referred to as the Small Block Chrysler V8. Properly called the "LA" series, it is an evolution of the 1956-1966 "A" family, which included displacements of 277-301-303-318-326 cu.in. The A was noted for its

99884-8<sup>c</sup>

99967-8

99820-8<sup>c</sup>

important part of this heritage is to help explain the unusual 59 degree lifter bore bank angle that carried over into the LA family. This was used in the A to provide the best compromise for lifter to pushrod angles for its inline lifter bore blocks. Also note there were 1964-1966 318 engines that were still the A version, and should not be confused with the 1967-1986 LA 318.

standard type distributor gear for long term reliability. Some early production and some later replacement and aftermarket cylinder heads may require modifications for pushrod clearance, due to their angle having changed resulting from the higher pushrod seats in the hydraulic roller lifters.

Steel billet mechanical roller camshafts are offered with Iron Gear versions for street performance and endurance

- a Requires 99423-8 lash caps.
- b Standard diameter valve springs, no machining required.
- c Must machine cylinder head.

### **1986-1991 318 (5.2L) & 1987-1991 360 (5.9L) "LA" V8**

These engines are a continuation of the LA series, being factory upgraded with hydraulic roller camshafts and lifters. Cylinder head changes were also made, with the valve spring envelope being reduced, making it very difficult to fit performance valve springs. Still designated with our 69 prefix, this engine group is listed separately to properly define the emissions legalities of the camshafts.

Hydraulic roller camshafts are offered, along with many valve train components.

### **1992-2002 5.2L & 5.9L Magnum V8**

The final upgrade to the LA family, the Magnum engines received non-adjustable pedestal mounted 1.6:1 ratio rocker arms from the factory. The nose of the camshaft was also shortened as a result of vehicle packaging requirements, so there is no camshaft interchangeability with the earlier LA engines. Our 70 prefix indicates this version.

We offer hydraulic roller camshafts and many valve train components for the Magnum. Our **36655-16** Pushrod Guideplate and Rocker Arm Stud Conversion Kit can be used to install adjustable stud mounted rocker arms, with no cylinder head machining required.

### **2002-2010 5.7L & 6.1L HEMI V8**

Chrysler's latest pushrod V8 capitalizes on the heritage of the legendary Chrysler Hemi powerplants of the 50's, 60's, and 70's. Loosely based around the LA engine's architecture, these are equipped with a hydraulic roller camshaft and .842" diameter hydraulic roller lifters. Crane Cams' 198 prefix denotes our products for these engines. Whenever upgrading to a performance camshaft, the cylinder deactivation system (MDS) lifters can not be used, and computer upgrades will be required. The 392 Crate engines are also included in this group.

We currently offer hydraulic roller camshafts, and other valve train components, with more products to be introduced.

### **Dodge R5**

This is an evolution of the LA engine, designed for rules specific oval track racing. These engines were never installed in any vehicles, or sold as a complete assembly. Normally paired with the P7 cylinder heads, these are built per application for each form of competition. This is known as our 184 prefix, with 8620 steel billet roller cams having 60mm journals available on special order.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337          | See pg. 350 | See pg. 362          | See pg. 360      | See pg. 306 | See pg. 328                       | See pg. 312       | See pg. 315   | See pg. 317 |
|--------------------------------|----------------------|-------------|----------------------|------------------|-------------|-----------------------------------|-------------------|---|-------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS        | RETAINERS   | VALVE STEM SEALS     | VALVE STEM LOCKS | PUSHRODS    | TIMING BELT AND SPROCKET ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
|                                | 99884-8 <sup>c</sup> | 99967-8     | 99820-8 <sup>c</sup> |                  |             |                                   |                   |   |             |
|                                | 99884-8              | 99967-8     | 99820-8              |                  |             |                                   |                   |   |             |
|                                | 99884-8 <sup>b</sup> | 99967-8     | 99820-8 <sup>b</sup> |                  |             |                                   |                   |   |             |
|                                | 99884-8 <sup>b</sup> | 99967-8     | 99820-8 <sup>b</sup> |                  |             |                                   |                   |   |             |
|                                | 99884-8 <sup>b</sup> | 99967-8     | 99820-8 <sup>b</sup> |                  |             |                                   |                   |   |             |
|                                | 99884-8 <sup>b</sup> | 99967-8     | 99820-8 <sup>b</sup> |                  |             |                                   |                   |   |             |
|                                | 99884-8 <sup>b</sup> | 99967-8     | 99820-8 <sup>b</sup> |                  |             |                                   |                   |   |             |

To avoid premature wear of the cam lobes the proper valve train geometry must be obtained. Put machinist dye (such as Dykem Layout Fluid) on the contact surface of the rocker followers. Hand turn the camshaft and observe the wear pattern created by the lobes. The drawing below shows you the correct and incorrect pattern. If necessary, correct the valve stem length or use a lash cap to obtain the correct pattern.

**a** Requires 99423-8 lash caps.  
**b** Must machine cylinder head.

## COMPLETE CAM SPECIFICATIONS

See pg. 286

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | FOLLOWERS | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Valve Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Hydraulic Roller Follower Camshafts</b>   |                                  |                       |  |           |  |   |                               |  |                     |                               |
| Excellent low end torque, smooth idle, daily usage, upgrade for stock applications, performance and fuel efficiency, 2200-3000 cruise RPM, 8.5 to 19.75 compression ratio advised.                                   | RFOR-214/420-12                  | 1000-4200             | 199541*                                    |           | 214  | 252   | 112                           | 0 34   | .000                | .420                          |
|  |                                  |                       |  |           | 214  | 252   |                               | 44 (10)  | .000                | .420                          |
| Good low end torque, good idle, daily usage, off road, performance and fuel efficiency, turbocharged performance, 2600-3200 cruise RPM, 8.75 to 10.5 compression ratio advised.                                      | RFOR-226/420-2S-12               | 1400-4600             | 199501*                                    |           | 226  | 274   | 112                           | 6 40   | .000                | .420                          |
|  |                                  |                       |  |           | 234  | 282   |                               | 54 0   | .000                | .420                          |
| Good mid range torque, fair idle, moderate performance usage, good mid-range HP, autocross, medium oval track, bracket racing, auto w/2500+ converter, 3200-3600 cruise RPM, 9.5 to 10.75 compression ratio advised. | RFOR-234/450-8                   | 2000-5600             | 199511*                                    |           | 234  | 282   | 108                           | 14 40  | .000                | .450                          |
|  |                                  |                       |  |           | 234  | 282   |                               | 50 4   | .000                | .450                          |
| Rough idle, performance usage, good mid-range torque and HP, oval track, bracket racing, auto w/3200+ converter, 10.0 to 11.5 compression ratio advised.   | RFOR-242/480-8                   | 2800-6600             | 199521*                                    |           | 242  | 290   | 108                           | 18 44  | .000                | .480                          |
|  |                                  |                       |  |           | 242  | 290   |                               | 54 8   | .000                | .480                          |
| Rough idle, performance usage, good upper RPM HP, oval track, bracket racing, auto w/3500+ converter, 10.5 to 12.0 compression ratio advised.  | RFOR-250/510-10                  | 3200-7000             | 199531*                                    |           | 250  | 298   | 110                           | 20 50  | .000                | .510                          |
|  |                                  |                       |  |           | 250  | 298   |                               | 60 10  | .000                | .510                          |
| <b>Mechanical Roller Follower Camshafts</b>  |                                  |                       |  |           |  |   |                               |  |                     |                               |
| Moderate competition only, good mid range RPM torque and HP, short oval track, bracket racing, auto w/3200+ converter, 10.5 to 12.0 compression ratio advised.   | RFOR-252/560-6                   | 3200-7000             | 198091*                                    |           | 252  | 284   | 106                           | 24 48  | .010                | .560                          |
|  |                                  |                       |  |           | 252  | 284   |                               | 56 16  | .012                | .560                          |
| Moderate competition only, good mid and upper RPM torque and HP, long oval track, bracket racing, auto w/4000+ converter, 11.5 minimum compression ratio advised.  | RFOR-260/584-8                   | 3600-7400             | 198101*                                    |           | 260  | 292   | 108                           | 27 53  | .010                | .584                          |
|  |                                  |                       |  |           | 260  | 292   |                               | 63 17  | .012                | .584                          |
| Competition only, good mid and upper RPM torque and HP, oval track, road course, bracket racing, auto w/race converter, 12.0 minimum compression ratio advised.  | RFOR-268/608-6                   | 4000-7800             | 198131*                                    |           | 268  | 300   | 106                           | 32 56  | .010                | .608                          |
|  |                                  |                       |  |           | 268  | 300   |                               | 64 24  | .012                | .608                          |
| Competition only, high RPM maximum performance applications, bracket racing, auto w/race converter, 12.5 minimum compression ratio advised, also high boost/high RPM turbocharged.                                   | RFOR-276/632-8                   | 4600-8400             | 198161*                                    |           | 276  | 308   | 108                           | 35 61  | .010                | .632                          |
|  |                                  |                       |  |           | 276  | 308   |                               | 71 25  | .012                | .632                          |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT NOTE:** Hydraulic Roller Camshafts are designed to be used with a Ford stock length valve. Failure to do this will give incorrect gross lift, incorrect rocker geometry, and cause premature wear and loss of power.

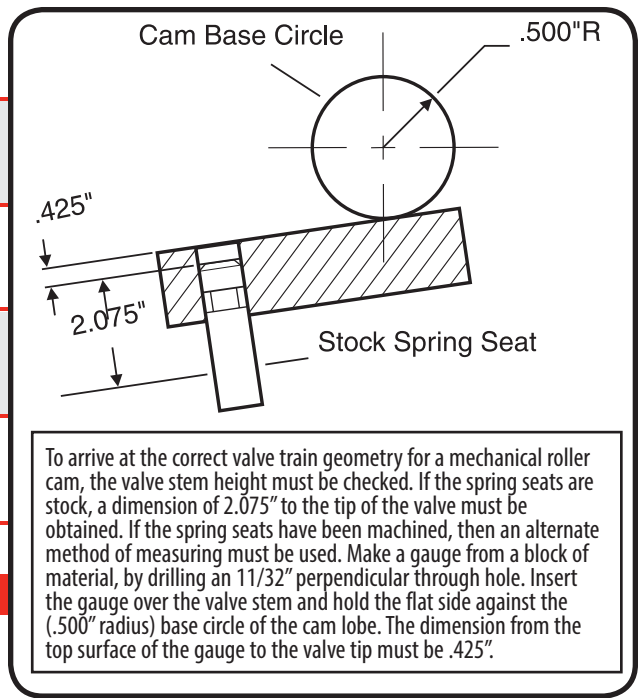
**IMPORTANT NOTE:** Mechanical roller cams must use a valve that is 4.900" overall length, such as a small block Chevrolet valve. There should be .300" from tip of valve to top of keeper groove. This valve combined with Crane springs, retainers and locks will enable you to obtain proper valve spring assembly height and give you a .090" cushion from coil bind.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337          | See pg. 350 | See pg. 362          | See pg. 360          | See pg. 306 | See pg. 328                       | See pg. 312       | See pg. 315   | See pg. 317 |
|--------------------------------|----------------------|-------------|----------------------|----------------------|-------------|-----------------------------------|-------------------|---|-------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS        | RETAINERS   | VALVE STEM SEALS     | VALVE STEM LOCKS     | PUSHRODS    | TIMING BELT AND SPROCKET ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
|                                | 99884-8 <sup>a</sup> | 99967-8     | 99820-8 <sup>a</sup> |                      |             |                                   |                   |   |             |
|                                | 99884-8 <sup>a</sup> | 99967-8     | 99820-8 <sup>a</sup> |                      |             |                                   |                   |   |             |
|                                | 99884-8 <sup>a</sup> | 99967-8     | 99820-8 <sup>a</sup> |                      |             |                                   |                   |   |             |
|                                | 99884-8 <sup>a</sup> | 99967-8     | 99820-8 <sup>a</sup> |                      |             |                                   |                   |   |             |
|                                | 99884-8 <sup>a</sup> | 99967-8     | 99820-8 <sup>a</sup> |                      |             |                                   |                   |   |             |
|                                | 99838-8 <sup>a</sup> | 99936-8     | 99820-8 <sup>a</sup> | 99096-1 <sup>b</sup> |             |                                   |                   |   |             |
|                                | 99838-8 <sup>a</sup> | 99936-8     | 99820-8 <sup>a</sup> | 99096-1 <sup>b</sup> |             |                                   |                   |   |             |
|                                | 99838-8 <sup>a</sup> | 99936-8     | 99820-8 <sup>a</sup> | 99096-1 <sup>b</sup> |             |                                   |                   |   |             |



**NOTE:** To install Mechanical Type Camshafts in the Ford 2300 c.c. engine, a method of effecting valve adjustment must be provided. Remove the hydraulic adjuster bodies from the cylinder head, then mill the top of the adjuster boss down .200". Machine 8 press-in sleeves from steel, approximately 1.700" long to replace the hydraulic adjusters. Drill and tap the center of each sleeve to 14mm x 1.25. The sleeves should then be pressed into the head, and secured by pinning or with a locking compound. The 71-74 Ford 2000 c.c. OHC engine's adjusters and locking nuts can then be used to provide valve adjustment. The rocker stabilizer springs from the 71-74 Ford 2000 c.c. OHC engine should also be used to maintain follower to adjuster contact.

a Must machine cylinder head.  
b Machined steel, heat treated. Required to obtain correct assembly height.

# Ford Zetec 4 Cylinder 95-02

2.0 Litre DOHC 4V

## COMPLETE CAM SPECIFICATIONS

See pg. 286

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | FOLLOWERS | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Cold<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------|--|---|-------------------------------|--|------------------------------|-------------------------------|
| <b>Mechanical Lifter Camshafts</b>   |                                  |                       |  |           |  |   |                               |  |                              |                               |
| Good low and mid range power, manual or auto trans OK, advise low restriction air intake and header with free-flowing exhaust  | <b>F-210/374-2SR-10</b>          | 1000-<br>6500         | <b>223-0010*</b>                           |           | 210<br>206                                 | 232<br>228                                    | 110                           | (1) 31<br>37 (11)                            | .008<br>.010                 | .374<br>.366                  |
|  |                                  |                       | ◆  |           |  |   |                               |  |                              |                               |
| Moderate performance usage, good mid range to upper RPM power, manual trans, advise upgraded air intake system, header with free-flowing exhaust.                                  | <b>F-214/382-2SR-9</b>           | 2000-<br>7000         | <b>223-0012*</b>                           |           | 214<br>210                                 | 236<br>232                                    | 109                           | 1 33<br>38 (8)                               | .008<br>.010                 | .382<br>.374                  |
|  |                                  |                       | ◆  |           |  |   |                               |  |                              |                               |
| Performance usage, upper RPM power, manual trans, good intake and exhaust with ported head recommended, good with nitrous or supercharger, 10.5 to 12.0 compression ratio advised. | <b>F-218/390-2SR-10</b>          | 3000-<br>8000         | <b>223-0014*</b>                           |           | 218<br>214                                 | 240<br>236                                    | 110                           | 2 36<br>41 (7)                               | .008<br>.010                 | .390<br>.382                  |
|  |                                  |                       | ◆  |           |  |   |                               |  |                              |                               |

CAMSHAFTS

# Ford Duratec 4 Cylinder 02-05

1.8-2.0-2.3 Litre DOHC 4V

## Mechanical Lifter Camshafts

|   |                         |               |                             |  |            |            |     |                  |              |              |
|---|-------------------------|---------------|-----------------------------|--|------------|------------|-----|------------------|--------------|--------------|
| Good low end and mid range power, smooth idle, performance upgrade, auto or manual trans, upgraded air intake and cat-back exhaust advised, will work with standard valve springs.  | <b>F-212/354-2SR-10</b> | 1000-<br>6000 | <b>224-0010<sup>a</sup></b> |  | 212<br>204 | 232<br>224 | 110 | (4) 36<br>32 (8) | .010<br>.012 | .374<br>.354 |
|   |                         |               | ◆                           |  |            |            |     |                  |              |              |
| Good mid range power, fair idle, performance usage in 5-speed cars and 2WD trucks, advise upgraded air intake system, intake manifold, and header with free flowing exhaust.  | <b>F-226/410-2SR-10</b> | 1500-<br>6500 | <b>224-0012<sup>a</sup></b> |  | 226<br>216 | 248<br>238 | 110 | 3 43<br>38 (2)   | .008<br>.010 | .410<br>.385 |
|   |                         |               | ◆                           |  |            |            |     |                  |              |              |
| Performance usage, requires stand-alone fuel management, high flow intake and exhaust systems, ported head, good for turbo or supercharger, also nitrous, 10.5 to 12.0 compression ratio advised.   | <b>F-236/435-2SR-10</b> | 2500-<br>7500 | <b>224-0014<sup>a</sup></b> |  | 236<br>226 | 258<br>248 | 110 | 8 48<br>43 3     | .008<br>.010 | .435<br>.410 |
|   |                         |               | ◆                           |  |            |            |     |                  |              |              |
| Competition only, drag racing, high RPM road race, serious off road, needs stand alone fuel management, high flow intake and exhaust, ported head, good with turbo or supercharger with spread lobe separation, 12.0 minimum compression ratio advised. | <b>F-246/460-2SR-10</b> | 3500-<br>8000 | <b>224-0016<sup>a</sup></b> |  | 246<br>236 | 268<br>258 | 110 | 13 53<br>48 8    | .008<br>.010 | .460<br>.435 |
|   |                         |               | ◆                           |  |            |            |     |                  |              |              |
| Competition only, high RPM drag racing, requires serious head, intake and exhaust systems, fuel management, good with high RPM turbo, supercharger, nitrous, 13.0 minimum compression ratio advised.  | <b>F-256/485-2SR-10</b> | 4500-<br>9000 | <b>224-0018<sup>a</sup></b> |  | 256<br>246 | 278<br>268 | 110 | 18 58<br>53 13   | .008<br>.010 | .485<br>.460 |
|   |                         |               | ◆                           |  |            |            |     |                  |              |              |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

|                                |               |             |                  |                  |             |                                |                   |   |             |
|--------------------------------|---------------|-------------|------------------|------------------|-------------|--------------------------------|-------------------|---|-------------|
| See pg. 358                    | See pg. 337   | See pg. 350 | See pg. 362      | See pg. 360      | See pg. 306 | See pg. 328                    | See pg. 312       | See pg. 315   | See pg. 317 |
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS | RETAINERS   | VALVE STEM SEALS | VALVE STEM LOCKS | PUSHRODS    | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |

Radical custom grinds are available on special order. Popular profiles include:  
**F-226/410 F-236/435 F-246/460**  
 The maximum performance racing camshafts for these engines are produced in two versions: Stock base circle (1.418"), that will work with standard length valves, but will require the cylinder head casting to be cleared for lobe clearance. Otherwise, the nose of the lobe will contact the head. Reduced base circle (1.318"), that will work with either stock length valves plus a .050" thick lash cap (Ferrea C10011), or with .050" longer valves. Lobe to cylinder head clearance should still be checked, particularly with the .460" lift grinds. You must specify the base circle diameter when ordering. These camshafts will not be applicable to the Focus SVT engines, due to their unique cam phaser and cam position sensors.

903-2007

Radical custom grinds are available on special order. Popular profiles include:  
**F-226/410 F-236/435 F-246/460 F-256/485**

903-2007

903-2007

903-2007

903-2007

a Valve spring and retainer kit **903-2007** required  
 b Includes valve springs and titanium retainers

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                     | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|--|----------------------------------|-----------------------|--|-----------------------------|--|---|-------------------------------|--|---------------------|-----------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |                             |  |   |                               |  |                     |                       |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.  | <b>H-192/2667-2S-12</b>          | 800-4200              | <b>500511*</b>                             | <b>99280-12</b>             | 192<br>204                                 | 248<br>260                                    | 112                           | (11) 23<br>39 (15)                           | .000<br>.000        | .429<br>.458          |
|  |                                  |                       | ⚡  |                             |  |   |                               |  |                     |                       |
| Good low end torque, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.  | <b>H-260-2</b>                   | 1200-4600             | <b>503901*</b>                             | <b>99280-12</b>             | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000        | .458<br>.487          |
|  |                                  |                       | ⚡  |                             |  |   |                               |  |                     |                       |
| Good low and mid range torque, good idle, daily usage and off road, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.   | <b>H-272-2</b>                   | 1800-5400             | <b>503941*</b>                             | <b>99280-12</b>             | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000        | .487<br>.515          |
|  |                                  |                       | ⚡  |                             |  |   |                               |  |                     |                       |
| Good low and mid range torque, fair idle, moderate performance usage, limited 1/4 - 3/8 mile oval track, serious off road, mild bracket racing, auto with 2500+ converter, 8.75 to 10.5 compression ratio advised. | <b>H-224/309-2-6</b>             | 2200-5600             | <b>500211*</b>                             | <b>99280-12</b>             | 224<br>234                                 | 288<br>298                                    | 106                           | 10 34<br>47 7                                | .000<br>.000        | .497<br>.523          |
|  |                                  |                       | ⚡  |                             |  |   |                               |  |                     |                       |
| Good mid to upper RPM torque and HP, performance usage, 3/8 - 1/2 mile oval track, radical off road, bracket racing, 11.0 to 12.25 compression ratio advised.  | <b>H-238/3347-8</b>              | 3200-6400             | <b>500641*</b>                             | <b>99280-12</b>             | 238<br>238                                 | 294<br>294                                    | 108                           | 16 42<br>52 6                                | .000<br>.000        | .539<br>.539          |
|  |                                  |                       | ⚡  |                             |  |   |                               |  |                     |                       |
| <b>Mechanical Lifter Camshafts</b>   |                                  |                       |  |                             |  |   |                               |  |                     |                       |
| Good mid range torque and HP, fair idle, moderate performance usage, off road, mild bracket racing, auto trans with 2000+ converter, 3400-3800 cruise RPM, 10.0 to 11.5 compression ratio advised.                 | <b>F-238/3200-2-10</b>           | 2600-6000             | <b>501181*</b>                             | <b>99257-12<sup>a</sup></b> | 238<br>248                                 | 304<br>314                                    | 110                           | 14 44<br>59 9                                | .022<br>.022        | .515<br>.537          |
|  |                                  |                       | ⚡  |                             |  |   |                               |  |                     |                       |
| Good upper to upper RPM torque and HP, 3/8 - 1/2 mile oval track, serious off road, bracket racing, auto with 2500+ converter, 11.5 minimum compression ratio advised.   | <b>F-246/359-2S-6</b>            | 3000-6200             | <b>501211*</b>                             | <b>99257-12<sup>a</sup></b> | 246<br>250                                 | 282<br>286                                    | 106                           | 21 45<br>55 15                               | .012<br>.012        | .578<br>.589          |
|  |                                  |                       | ⚡  |                             |  |   |                               |  |                     |                       |
| Good upper RPM HP, performance usage, 3/8 - 1/2 mile oval track, bracket racing, auto with 3000+ converter, 12.0 minimum compression ratio advised.  | <b>F-256/3634-2S-8</b>           | 3600-6800             | <b>501311*</b>                             | <b>99257-12<sup>a</sup></b> | 256<br>264                                 | 292<br>300                                    | 108                           | 23 53<br>63 21                               | .026<br>.026        | .585<br>.604          |
|  |                                  |                       | ⚡  |                             |  |   |                               |  |                     |                       |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

NOTE: Roller camshaft kit components are available on special order.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i> | <i>See pg. 350</i> | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>    | <i>See pg. 328</i>             | <i>See pg. 312</i> | <i>See pg. 315</i>                                  | <i>See pg. 317</i> |
|--------------------------------|--------------------|--------------------|-----------------------|----------------------|-----------------------|--------------------------------|--------------------|---|--------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS      | RETAINERS          | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS              | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE          |
|                                | 99838-12           | 99944-12           | 99820-12 <sup>b</sup> | 99097-1 <sup>c</sup> | 50621-12 <sup>d</sup> |                                |                    |   |                    |
|                                | 99838-12           | 99944-12           | 99820-12 <sup>b</sup> | 99097-1 <sup>c</sup> | 50621-12 <sup>d</sup> |                                |                    |   |                    |
|                                | 99838-12           | 99944-12           | 99820-12 <sup>b</sup> | 99097-1 <sup>c</sup> | 50621-12 <sup>d</sup> |                                |                    |   |                    |
|                                | 99838-12           | 99944-12           | 99820-12 <sup>b</sup> | 99097-1 <sup>c</sup> | 50621-12 <sup>d</sup> |                                |                    |   |                    |
|                                | 99838-12           | 99944-12           | 99820-12 <sup>b</sup> | 99097-1 <sup>c</sup> | 50621-12 <sup>d</sup> |                                |                    |   |                    |
|                                | 99893-12           | 99953-12           | 99820-12 <sup>b</sup> | 99097-1 <sup>c</sup> | 50621-12 <sup>d</sup> |                                |                    |   |                    |
|                                | 99893-12           | 99953-12           | 99820-12 <sup>b</sup> | 99097-1 <sup>c</sup> | 50621-12 <sup>d</sup> |                                |                    |   |                    |
|                                | 99893-12           | 99953-12           | 99820-12 <sup>b</sup> | 99097-1 <sup>c</sup> | 50621-12 <sup>d</sup> |                                |                    |   |                    |

**a** Requires appropriate Crane pushrods.  
**b** Must machine cylinder head.  
**c** Machined steel, heat treated.  
**d** Heavy wall, heat treated.

# Ford Small Block V8 Tech Tips & Notes

**1962-1987 221-255 (4.2L) – 260-289-302 (5.0L) cu.in. V8 and 1988-1995 302 (5.0L) cu.in. V8 trucks (except 1982-1995 302 (5.0L) H.O.)**

Ford's modern line of small block V8 engines was introduced in 1962, with the 221 and 260 cu.in. versions. This engine family (properly referred to as the Windsor, even if it isn't the 351 cu.in. variety) has inline lifter bores in the block, and cylinder heads with inline valves equipped with 1.6:1 ratio rocker arms. The firing order is 1-5-4-2-6-3-7-8.

These engines are designated by Crane's 36 prefix. We offer hydraulic, hydraulic roller (retrofit and OE style), mechanical, and mechanical roller camshafts for them. A wide-ranging line of valve train components is also available.

The 1962 and 1963 cylinder heads have 5/16" diameter valve stems (different valve spring retainers, valve locks, and valve stem seals required), while the 1964 and later engines have 11/32" valve stems.

From 1962 to 1965, the rocker arm studs were a straight 3/8" diameter adjustable configuration. In 1966, bottleneck 3/8 – 5/16" rocker arm studs were installed, resulting in a non-adjustable configuration. The exception would be the HiPo 289 engines, offered through 1967, which had mechanical lifter camshafts, and retained the adjustable style straight 3/8" studs. Our **99768-16** positive locking nuts will permit valve adjustment on the bottleneck stud applications. In 1977, a net lash pedestal mount rocker arm system was installed, continuing with the remainder of production through 1995. These pedestal mount rocker cylinder heads can be easily converted to an adjustable configuration for hydraulic and hydraulic roller street applications by using our Pushrod Guideplate Conversion Kits. Part number **36655-16** provides for 3/8" stud mounted adjustable rocker arms, and **36656-16** is for 7/16" stud mounted rocker arms. No machining is necessary, and your standard pushrods can be maintained, thanks to the composite bushing inserts in the pushrod guideplates. For mechanical and mechanical roller applications, we advise the heads be machined for screw-in rocker arm studs and pushrod guideplates.

The production and aftermarket cylinder heads for the Windsor and Cleveland families all have the same valve layout, with the exception of the Gurney-Weslake pieces. If you are fortunate to have a set of these, we can custom produce a roller camshaft having the proper lobe layout.

Most 1985-1987 302, all 1988-97 302 passenger car, and all 1996-2000 302 truck engines are equipped with hydraulic roller camshafts and lifters. The firing order of 1-5-4-2-6-3-7-8 is maintained for these applications. Conventional hydraulic, mechanical, and roller lifter camshafts can be installed in these engines if the appropriate kit components are used.

The 1985-95 302 H.O. engines, although closely related, have a different firing order, and are discussed later on this page.

**1969-1970 Boss 302 V8**

Specifically developed for the Trans Am road racing series, the Boss 302 had canted valve "Cleveland" style cylinder heads installed on the 302 block. Since these heads have large ports and valves, and are intended for constant high RPM usage, a street driven application should have a relatively mild camshaft installed to enhance the torque and drivability. Rocker arm studs are a straight 7/16" diameter, with adjustable 1.73:1 ratio rocker arms required for the factory installed mechanical lifter camshaft. Although the valves are staggered, the same length pushrods are used for the intake and exhaust.

Due to the Boss heads' different valve spring requirements, and the increased rocker ratio, this engine is designated by Crane's 27 prefix (even though the camshaft is physically the same as the 36 prefix). We offer hydraulic, retrofit hydraulic roller, mechanical, and mechanical roller camshafts for them. An extensive line of valve train components is also available.

**1985-1995 5.0L (302) H.O. V8**

Although closely related to the standard 302, the 1985-95 5.0L H.O. are equipped with hydraulic roller lifters, with camshafts having a firing order of 1-3-7-2-6-5-4-8 (the same as the 351 Windsor). Our 44 prefix designates these engines. The camshafts are dimensionally the same as the 36 prefix, with the different firing order constituting the primary change. Camshafts can be interchanged, providing the necessary changes are performed for the proper firing order.

We offer hydraulic, hydraulic roller, mechanical, and mechanical roller camshafts. A wide-ranging line of valve train components is also available.

The standard pedestal mount rocker cylinder heads can be easily converted to an adjustable configuration for hydraulic and hydraulic roller street applications by using our Pushrod Guideplate Conversion Kits. Part number **36655-16** provides for 3/8" stud mounted adjustable rocker arms, and **36656-16** is for 7/16" stud mounted rocker arms. No machining is necessary, and your standard pushrods can be maintained, thanks to the composite bushing inserts in the pushrod guideplates. For mechanical and mechanical roller applications, we advise the heads be machined for screw-in rocker arm studs and pushrod guideplates.

1993-1995 SVT Cobra 5.0 Mustangs were factory equipped with aluminum needle bearing roller tip 1.7:1 pedestal mount rocker arms. These are our **44746-16**, designed for basic bolt-on installation, but make sure to check for adequate spring travel due to the increased valve lifts when installing on other engines.

**1969-1993 351 (5.8L) cu.in. Windsor and 1982-1984 302 (5.0L) cu.in. H.O., also 1994-1997 351W, and 302 SVO/351 SVO V8**

Another derivative in the Windsor family, the 351 engine blocks incorporate 1.3" taller deck heights to accommodate the increased displacement. Lifter bores are still inline, as are the valves in the cylinder heads, and the 1.6:1 rocker arm ratio is retained. Most notably, the firing order was changed to 1-3-7-2-6-5-4-8. Our 44 prefix designates these engines. The camshafts are dimensionally the same as the 36 prefix, with the different firing order being the primary change. Camshafts can be interchanged, providing the necessary changes are performed for the proper firing order. Additionally, the 1982-1984 302 H.O. engines also were equipped with hydraulic lifter camshafts having this revised firing order.

We offer hydraulic, hydraulic roller (retrofit and OE style), mechanical, and mechanical roller camshafts and a wide-ranging line of valve train components for these engines.

From 1969 to 1976, bottleneck 3/8 - 5/16" rocker arm studs were installed in the cylinder heads, resulting in a non-adjustable configuration. Our **99768-16** positive locking nuts will permit valve adjustment for these applications. In 1977, a net lash pedestal mount rocker arm system was installed, continuing for the remainder of production through 1997. These pedestal mount rocker cylinder heads can be easily converted to an adjustable configuration for hydraulic and hydraulic roller street applications by using our Pushrod Guideplate Conversion Kits. Part number **36655-16** provides for 3/8" stud mounted adjustable rocker arms, and **36656-16** is for 7/16" stud mounted rocker arms. No machining is necessary, and your standard pushrods can be maintained, thanks to the composite bushing inserts in the pushrod guideplates. For mechanical and mechanical roller applications, we advise the heads be machined for screw-in rocker arm studs and pushrod guideplates.

**1970-1982 351C-Boss 351-351M-400 cu.in. V8**

The Ford 335 engine family (commonly called the "Cleveland") shared cylinder bore spacing dimensions, and the head bolt pattern with the Windsor engines, but few other parts are interchangeable. The inline lifter bores were retained, but they are at a different bank angle from the Windsor. Cam bearing sizes are also different, as are the distributor gear dimensions. The valves in the cylinder heads are canted (staggered), but the same length pushrods are used for the intake and exhaust valves. The rocker arm ratio is 1.73:1.

These engines are designated by Crane's 52 prefix. We offer hydraulic, retrofit hydraulic roller, mechanical, and mechanical roller camshafts for them. A wide-ranging line of valve train components is also available.

The pedestal mount rocker cylinder heads can be easily converted to an adjustable configuration for hydraulic and hydraulic roller street applications by using our Pushrod Guideplate Conversion Kits. Part number **52655-16** provides for adjustable configuration 7/16" stud mounted rocker arms. No machining is necessary, and your standard pushrods can be maintained, thanks to the composite bushing inserts in the pushrod guideplates. For mechanical and mechanical roller applications, we advise the heads be machined for screw-in rocker arm studs and pushrod guideplates.

The 1971 Boss 351 and 1972 351C H.O. featured cylinder heads with straight 7/16" rocker arm studs and pushrod guideplates, required for the mechanical lifter camshafts that were standard equipment.

The Fontana Clevor block also uses our 52 prefix camshafts, not the 36 or 44 prefix Windsor style items.

There can be a possible misapplication of components when choosing the proper retainers and valve stem locks for these engines. Although the valve stems are all 11/32" diameter, the configuration of the valve locks were changed. Note the following explanation to insure that the proper components are being used:

**1970-1977 351C-351M-400** - Intake and exhaust valves use multiple groove valve stem locks, having a large outside diameter, requiring the use of 3/8" type valve spring retainers.

**1971 Boss 351 / 1972 351C H.O.** - Intake and exhaust valves use standard single groove valve stem locks, requiring the use of 11/32" valve spring retainers.

**1978 351M-400** - The intake valves use multiple groove valve stem locks, having a large outside diameter, requiring the use of 3/8" type valve spring retainers. The exhaust valves use standard single groove valve stem locks, requiring the use of 11/32" valve spring retainers.

**1979-1982 351M-400** - Intake and exhaust valves use standard single groove valve stem locks, requiring the use of 11/32" valve spring retainers.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code             | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b><br>Improves low-end and mid-range torque and HP in speed density fuel injected (SFI) truck (non-roller tappet) applications. Fine for auto or manual trans. Calif. legal 91-93 Federally certified trucks with MFMS.8T5HZCO, NFMS.8T5HZC1, OR PFMS.8T5HZD4 engine families. (50 state legal, C.A.R.B. E.O. D-225-24)                                  | <b>2021</b>                      | 800-4200              | <b>364112<sup>a</sup></b>                              | <b>99280-16</b> | 190  | 252   | 109                           | (9) 19                                       | .000                        | .416                          |
|   |                                  |                       | <b>1</b>   |                 | 198  | 260   | 33 (15)                       | .000   | .432                        |                               |
| Excellent low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 8.0 to 9.5 compression ratio advised.   | <b>Energizer<br/>260 H10</b>     | 1200-4600             | <b>13003<sup>a</sup></b><br><b>130032<sup>b</sup></b>  | <b>99280-16</b> | 204  | 260   | 110                           | (3) 27                                       | .000                        | .456                          |
|   |                                  |                       | <b>3</b>   |                 | 204  | 260   | 37 13                         | .000   | .456                        |                               |
| Great low end torque and HP, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised. (50 state legal, pre-computer, C.A.R.B. E.O. D-225-32)  | <b>H-260-2</b>                   | 1200-4800             | <b>363901</b><br><b>363902<sup>c</sup></b>             | <b>99280-16</b> | 204  | 260   | 112                           | (5) 29                                       | .000                        | .456                          |
|   |                                  |                       | <b>1</b>   |                 | 216  | 272   | 45 (9)                        | .000   | .484                        |                               |
| Great low end torque and HP, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.   | <b>Z-256-2</b>                   | 1200-5000             | <b>363501<sup>a</sup></b><br><b>363502<sup>c</sup></b> | <b>99280-16</b> | 206  | 256   | 112                           | (4) 30                                       | .000                        | .461                          |
|   |                                  |                       | <b>3</b>   |                 | 212  | 262   | 43 (11)                       | .000   | .475                        |                               |
| Good low end torque, smooth idle, daily usage, fuel economy, light towing, off road, 2200-2700 cruise RPM, 8.5 to 10.0 compression ratio advised.   | <b>Energizer<br/>266 H10</b>     | 1400-4800             | <b>13004<sup>a</sup></b><br><b>130042<sup>b</sup></b>  | <b>99280-16</b> | 210  | 266   | 110                           | 0 30   | .000                        | .469                          |
|   |                                  |                       | <b>3</b>   |                 | 210  | 266   | 40 (10)                       | .000   | .469                        |                               |
| Excellent low end and mid range torque and HP, good idle, daily usage, off road, towing, economy, 2400-2800 cruise RPM, 8.5 to 10.0 compression ratio advised.  | <b>H-266-2</b>                   | 1400-5200             | <b>363931<sup>a</sup></b><br><b>363932<sup>c</sup></b> | <b>99280-16</b> | 210  | 266   | 114                           | (4) 34                                       | .000                        | .456                          |
|   |                                  |                       | <b>3</b>   |                 | 218  | 274   | 48 (10)                       | .000   | .472                        |                               |
| Good low end and mid range torque, good idle, daily usage, off road, fuel efficiency plus performance, 2600-3000 cruise RPM, 8.75 to 10.0 compression ratio advised.  | <b>Energizer<br/>272 H10</b>     | 1600-5200             | <b>13005<sup>a</sup></b><br><b>130052<sup>b</sup></b>  | <b>99280-16</b> | 216  | 272   | 110                           | 3 33   | .000                        | .484                          |
|   |                                  |                       | <b>3</b>   |                 | 216  | 272   | 43 (7)                        | .000   | .484                        |                               |
| Good low end and mid range torque and HP, good idle, daily usage and off road, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised, w/centrifugal or small Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised. Also good w/plate nitrous system. (50 state legal, pre-computer, C.A.R.B. E.O. D-225-24) | <b>H-272-2</b>                   | 1800-5400             | <b>363941</b><br><b>363942<sup>c</sup></b>             | <b>99280-16</b> | 216  | 272   | 112                           | 1 35   | .000                        | .484                          |
|   |                                  |                       | <b>1</b>   |                 | 228  | 284   | 51 (3)                        | .000   | .512                        |                               |
| Good low end and mid range torque and HP, good idle, daily usage and off road, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised, w/centrifugal or small Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised. Also good w/plate nitrous system.  | <b>Z-268-2</b>                   | 1800-5600             | <b>363511<sup>a</sup></b><br><b>363512<sup>c</sup></b> | <b>99280-16</b> | 218  | 268   | 112                           | 2 36   | .000                        | .490                          |
|   |                                  |                       | <b>3</b>   |                 | 224  | 274   | 49 (5)                        | .000   | .504                        |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller camshafts and lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** Specify if heads with 5/16" valve stems are used. These valve springs and retainers cannot be used with short valve stem heads.

**NOTE:** Ford 221 thru 302 camshafts can be used in 351 Windsor engines if the engine is changed to 221 thru 302

firing order (1-5-4-2-6-3-7-8). Ford 351W firing order is 1-3-7-2-6-5-4-8.

**NOTE:** To provide the most accurate valve adjustment on hydraulic lifter camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using **99768-16** positive locking nuts will permit valve adjustment. **For engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1).** Refer to page 324 for details.

**IMPORTANT:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (**36655-16**) for street applications, enabling the 1977-00 255 and 302 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms

without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our **44975-1** or **44984-1** timing chain and gear assemblies, a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Left hand rotation hydraulic camshafts are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** These camshafts also fit the 1969-70 Ford-Mercury Boss 302 V-8 engines. Some kit components will differ. Contact Crane's Performance Consultants for details.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362      | See pg. 360          | See pg. 306                                    | See pg. 328                    | See pg. 312                                    | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-------------|------------------|----------------------|--|--------------------------------|--|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS                              | — ALUMINUM CRANE CLASSIC/ ENERGIZER                                     | ROCKERS — GOLD RACE   |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                  | 99097-1 <sup>e</sup> | 36621-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup>           | 36800-16 <sup>i</sup><br>36801-16 <sup>j</sup> | 36774-16 <sup>k</sup><br>11746-16 <sup>l</sup><br>44746-16 <sup>m</sup> | 36750-16 <sup>n</sup><br>36759-16 <sup>o</sup><br>36758-16 <sup>p</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                  | 99097-1 <sup>e</sup> | 36621-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup>           | 36800-16 <sup>i</sup><br>36801-16 <sup>j</sup> | 36774-16 <sup>k</sup><br>11746-16 <sup>l</sup><br>44746-16 <sup>m</sup> | 36750-16 <sup>n</sup><br>36759-16 <sup>o</sup><br>36758-16 <sup>p</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                  | 99097-1 <sup>e</sup> | 36621-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup>           | 36800-16 <sup>i</sup><br>36801-16 <sup>j</sup> | 36774-16 <sup>k</sup><br>11746-16 <sup>l</sup><br>44746-16 <sup>m</sup> | 36750-16 <sup>n</sup><br>36759-16 <sup>o</sup><br>36758-16 <sup>p</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                  | 99097-1 <sup>e</sup> | 36621-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup>           | 36800-16 <sup>i</sup><br>36801-16 <sup>j</sup> | 36774-16 <sup>k</sup><br>11746-16 <sup>l</sup><br>44746-16 <sup>m</sup> | 36750-16 <sup>n</sup><br>36759-16 <sup>o</sup><br>36758-16 <sup>p</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                  | 99097-1 <sup>e</sup> | 36621-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup>           | 36800-16 <sup>i</sup><br>36801-16 <sup>j</sup> | 36774-16 <sup>k</sup><br>11746-16 <sup>l</sup><br>44746-16 <sup>m</sup> | 36750-16 <sup>n</sup><br>36759-16 <sup>o</sup><br>36758-16 <sup>p</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                  | 99097-1 <sup>e</sup> | 36621-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup>           | 36800-16 <sup>i</sup><br>36801-16 <sup>j</sup> | 36774-16 <sup>k</sup><br>11746-16 <sup>l</sup><br>44746-16 <sup>m</sup> | 36750-16 <sup>n</sup><br>36759-16 <sup>o</sup><br>36758-16 <sup>p</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                  | 99097-1 <sup>e</sup> | 36621-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup>           | 36800-16 <sup>i</sup><br>36801-16 <sup>j</sup> | 36774-16 <sup>k</sup><br>11746-16 <sup>l</sup><br>44746-16 <sup>m</sup> | 36750-16 <sup>n</sup><br>36759-16 <sup>o</sup><br>36758-16 <sup>p</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                  | 99097-1 <sup>e</sup> | 36621-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup>           | 36800-16 <sup>i</sup><br>36801-16 <sup>j</sup> | 36774-16 <sup>k</sup><br>11746-16 <sup>l</sup><br>44746-16 <sup>m</sup> | 36750-16 <sup>n</sup><br>36759-16 <sup>o</sup><br>36758-16 <sup>p</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                  | 99097-1 <sup>e</sup> | 36621-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup>           | 36800-16 <sup>i</sup><br>36801-16 <sup>j</sup> | 36774-16 <sup>k</sup><br>11746-16 <sup>l</sup><br>44746-16 <sup>m</sup> | 36750-16 <sup>n</sup><br>36759-16 <sup>o</sup><br>36758-16 <sup>p</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                  | 99097-1 <sup>e</sup> | 36621-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup>           | 36800-16 <sup>i</sup><br>36801-16 <sup>j</sup> | 36774-16 <sup>k</sup><br>11746-16 <sup>l</sup><br>44746-16 <sup>m</sup> | 36750-16 <sup>n</sup><br>36759-16 <sup>o</sup><br>36758-16 <sup>p</sup> |

Section Continued

- a Cam and Lifter Kit, includes installation lubricants and Rocker Arm Pedestal Shim Kit.
- b Cam and Lifter Kit, includes assembly lubricant.
- c Cam and Lifter Kit, includes installation lubricants, and rocker arm adjusting nuts.
- d Contains standard diameter valve springs, no machining required.
- e Machined steel, heat treated.
- f For 63-68 engines, heavy wall, heat treated for use with or without guideplates.
- g For 69-95 engines, heavy wall, heat treated for use with or without guideplates.
- h For 73-00 engines, performance steel billet gears and roller chain set.
- i 1.6 ratio, cast, non-rail type for 3/8" studs, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- j 1.6 ratio, cast, rail type for 3/8" studs, non-adjustable with 5/16" top bottleneck studs, adjustable with straight 3/8" studs and locking nuts.

- k Crane Classic extruded, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- l Energizer, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- m Energizer, 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- n 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- o 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- p 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.

### COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code  | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh. | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|---|--|--|---|-------------------------------|---|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |   |  |  |   |                               |   |                             |                               |
| Good mid range torque, fair idle, daily usage, mild bracket racing, auto trans w/2500+ converter, 2700-3200 cruise RPM, 9.5 to 10.75 compression ratio advised.  | <b>Energizer<br/>278 H10</b>     | 2200-<br>5600         | <b>13009*</b><br><b>130092<sup>a</sup></b>  | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 222<br>222                                 | 278<br>278                                    | 110                           | 6 36<br>46 (4)                                | .000<br>.000                | .498<br>.498                  |
| Moderate competition, rough idle, good mid-range torque and HP, limited oval track, mild bracket racing, serious off road, auto trans w/2500+ converter, 9.5 to 11.0 compression ratio advised.  | <b>H-222/3114-2S1-6</b>          | 2200-<br>5400         | <b>360331*</b>                              | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 222<br>228                                 | 278<br>284                                    | 106                           | 9 33<br>44 4                                  | .000<br>.000                | .498<br>.512                  |
| Good mid range torque and HP, good idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised, also mild supercharged, nitrous.  | <b>H-278-2</b>                   | 2200-<br>5800         | <b>363801*</b><br><b>363802<sup>b</sup></b> | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 222<br>234                                 | 278<br>290                                    | 114                           | 2 40<br>56 (2)                                | .000<br>.000                | .498<br>.527                  |
| Good mid range torque and HP, good idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised, also mild supercharged, nitrous.  | <b>Z-274-2</b>                   | 2200-<br>6000         | <b>363521*</b><br><b>363522<sup>b</sup></b> | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 224<br>230                                 | 274<br>280                                    | 110                           | 3 41<br>54 (4)                                | .000<br>.000                | .504<br>.518                  |
| Good mid range to upper RPM torque, fair idle, moderate performance usage, oval track, Street Stock, Enduro, Hobby, 1/4-3/8 mile, bracket racing, Street, Heavy, Pro E.T., Super E.T., auto trans w/3000+ converter, 3200-3600 cruise RPM, 9.5 to 11.0 compression ratio advised.  | <b>H-288</b>                     | 2400-<br>6000         | <b>364381*</b><br><b>364382<sup>c</sup></b> | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 226<br>226                                 | 288<br>288                                    | 108                           | 10 36<br>46 0                                 | .000<br>.000                | .488<br>.488                  |
| Good mid range to upper RPM torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 9.5 to 11.5 compression ratio advised, also w/plate or manifold nitrous system, or w/centrifugal or Roots supercharger, 10 lbs. max. boost w/8.5 maximum compression ratio.                                     | <b>H-286-2</b>                   | 2600-<br>6200         | <b>364551*</b><br><b>364552<sup>b</sup></b> | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 226<br>236                                 | 286<br>296                                    | 110                           | 8 38<br>53 3                                  | .000<br>.000                | .502<br>.520                  |
| Good mid range to upper RPM torque, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised.   | <b>Energizer<br/>284 H12</b>     | 2800-<br>6200         | <b>13006*</b><br><b>130062<sup>a</sup></b>  | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 228<br>228                                 | 284<br>284                                    | 112                           | 7 41<br>53 (3)                                | .000<br>.000                | .512<br>.512                  |
| Good upper RPM torque and HP, rough idle, performance usage, bracket racing: Pro E.T., Super E.T., auto trans w/ race converter, oval track: Street Stock, Enduro, Hobby, 3/8-1/2 mile, 3800-4200 cruise RPM, 10.0 to 11.5 compression ratio advised. Good w/Roots supercharger, 15 lbs. maximum boost w/8.0 max. compression ratio advised, or w/manifold nitrous system. | <b>H-296-2</b>                   | 3200-<br>6800         | <b>364561*</b><br><b>364562<sup>c</sup></b> | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 236<br>240                                 | 296<br>300                                    | 110                           | 13 43<br>55 5                                 | .000<br>.000                | .520<br>.526                  |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller camshafts and lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** Specify if heads with 5/16" valve stems are used. These valve springs and retainers cannot be used with short valve stem heads.

**NOTE:** Ford 221 thru 302 camshafts can be used in 351 Windsor engines if the engine is changed to 221 thru 302 firing order (1-5-4-2-6-3-7-8). Ford 351W firing order is 1-3-7-2-6-5-4-8.

**NOTE:** To provide the most accurate valve adjustment on hydraulic lifter camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using **99768-16** positive locking nuts will permit valve adjustment. **For engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1).** Refer to page 324 for details.

**IMPORTANT:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (**36655-16**) for street applications, enabling the 1977-00 255 and 302 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may

cause idling and performance problems when installing aftermarket camshafts. We recommend using our **44975-1** or **44984-1** timing chain and gear assemblies, a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Left hand rotation hydraulic camshafts are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** These camshafts also fit the 1969-70 Ford-Mercury Boss 302 V-8 engines. Some kit components will differ. Contact Crane's Performance Consultants for details.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                                  | See pg. 312                                    | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|--|--|--|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS                              | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER                     | GOLD RACE   |
| 36308-1 <sup>e</sup>           | 96803-16 <sup>e</sup> | 99946-16                          |                       | 99097-1 <sup>h</sup>                         | 36621-16 <sup>j</sup><br>36622-16 <sup>k</sup> | 44975-1 <sup>l</sup>                         | 36800-16 <sup>n</sup><br>36801-16 <sup>o</sup> | 36774-16 <sup>p</sup><br>11746-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36750-16 <sup>s</sup><br>36759-16 <sup>t</sup><br>36758-16 <sup>u</sup> |
| 36308-1 <sup>e</sup>           | 96803-16 <sup>e</sup> | 99946-16                          |                       | 99097-1 <sup>h</sup>                         | 36621-16 <sup>j</sup><br>36622-16 <sup>k</sup> | 44975-1 <sup>l</sup><br>44984-1 <sup>m</sup> | 36800-16 <sup>n</sup><br>36801-16 <sup>o</sup> | 36774-16 <sup>p</sup><br>11746-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36750-16 <sup>s</sup><br>36759-16 <sup>t</sup><br>36758-16 <sup>u</sup> |
| 36308-1 <sup>e</sup>           | 96803-16 <sup>e</sup> | 99946-16                          |                       | 99097-1 <sup>h</sup>                         | 36621-16 <sup>j</sup><br>36622-16 <sup>k</sup> | 44975-1 <sup>l</sup>                         | 36800-16 <sup>n</sup><br>36801-16 <sup>o</sup> | 36774-16 <sup>p</sup><br>11746-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36750-16 <sup>s</sup><br>36759-16 <sup>t</sup><br>36758-16 <sup>u</sup> |
| 36308-1 <sup>e</sup>           | 96803-16 <sup>e</sup> | 99946-16                          |                       | 99097-1 <sup>h</sup>                         | 36621-16 <sup>j</sup><br>36622-16 <sup>k</sup> | 44975-1 <sup>l</sup>                         | 36800-16 <sup>n</sup><br>36801-16 <sup>o</sup> | 36774-16 <sup>p</sup><br>11746-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36750-16 <sup>s</sup><br>36759-16 <sup>t</sup><br>36758-16 <sup>u</sup> |
| 36308-1 <sup>e</sup>           | 96803-16 <sup>e</sup> | 99946-16                          |                       | 99097-1 <sup>h</sup>                         | 36621-16 <sup>j</sup><br>36622-16 <sup>k</sup> | 44975-1 <sup>l</sup>                         | 36800-16 <sup>n</sup><br>36801-16 <sup>o</sup> | 36774-16 <sup>p</sup><br>11746-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36750-16 <sup>s</sup><br>36759-16 <sup>t</sup><br>36758-16 <sup>u</sup> |
|                                | 96874-16 <sup>f</sup> | 99946-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup><br>99094-1 <sup>i</sup> | 36621-16 <sup>j</sup><br>36622-16 <sup>k</sup> | 44975-1 <sup>l</sup><br>44984-1 <sup>m</sup> | 36800-16 <sup>n</sup><br>36801-16 <sup>o</sup> | 36774-16 <sup>p</sup><br>11746-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36750-16 <sup>s</sup><br>36759-16 <sup>t</sup><br>36758-16 <sup>u</sup> |
| 36308-1 <sup>e</sup>           | 96803-16 <sup>e</sup> | 99946-16                          |                       | 99097-1 <sup>h</sup>                         | 36621-16 <sup>j</sup><br>36622-16 <sup>k</sup> | 44975-1 <sup>l</sup>                         | 36800-16 <sup>n</sup><br>36801-16 <sup>o</sup> | 36774-16 <sup>p</sup><br>11746-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36750-16 <sup>s</sup><br>36759-16 <sup>t</sup><br>36758-16 <sup>u</sup> |
|                                | 96874-16 <sup>f</sup> | 99946-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup><br>99094-1 <sup>i</sup> | 36621-16 <sup>j</sup><br>36622-16 <sup>k</sup> | 44975-1 <sup>l</sup><br>44984-1 <sup>m</sup> | 36800-16 <sup>n</sup><br>36801-16 <sup>o</sup> | 36774-16 <sup>p</sup><br>11746-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36750-16 <sup>s</sup><br>36759-16 <sup>t</sup><br>36758-16 <sup>u</sup> |

- a Cam and Lifter Kit, includes assembly lubricant.
- b Cam and lifter kit, includes installation lubricants, and rocker arm adjusting nuts.
- c Cam, lifter, and valve spring kit, includes installation lubricants.
- d Optional Hi Intensity hydraulic lifters, see page 292 for details.
- e Contains standard diameter valve springs, no machining required.
- f Must machine cylinder heads.
- g Requires Crane Multi Fit valve locks.
- h Machined steel, heat treated.
- i Machined steel, heat treated, Multi Fit.
- j For 63-68 engines, heavy wall, heat treated for use with or without guideplates.
- k For 69-95 engines, heavy wall, heat treated for use with or without guideplates.
- l For 73-00 engines, performance steel billet gears and roller chain set.
- m For 73-00 engines, Pro Series steel billet gears and roller chain set.
- n 1.6 ratio, cast, non-rail type for 3/8" studs, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- o 1.6 ratio, cast, rail type for 3/8" studs, non-adjustable with 5/16" top bottleneck studs, adjustable with straight 3/8" studs and locking nuts.
- p Crane Classic extruded, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- q Energizer, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- r Energizer, 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- s 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- t 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- u 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number   | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code       | LIFTERS                     | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|---|------------------------------------|-----------------------|--|-----------------------------|--|---|-------------------------------|--|---------------------|-----------------------|
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |                                    |                       |  |                             |  |   |                               |  |                     |                       |
| Brute low end torque, smooth idle, daily usage, towing, performance and fuel efficiency, normally used in engines originally equipped with hydraulic roller camshafts.  | <b>2020</b>                        | 800-4600              | <b>364211<sup>a</sup></b>                        | <b>36530-16<sup>e</sup></b> | 198<br>208                                 | 260<br>270                                    | 112                           | (13) 31<br>36 (8)                            | .000<br>.000        | .445<br>.470          |
| Excellent low end and mid range torque and HP, good idle, daily usage, performance and fuel efficiency, off road, towing, 2400-3200 cruise RPM, 8.75 to 10.0 comp. ratio advised.                                       | <b>HR-216/325-2S-12</b>            | 1800-5600             | <b>369541<sup>b,c</sup></b>                      | <b>36532-16<sup>f</sup></b> | 216<br>224                                 | 278<br>286                                    | 112                           | 1 35<br>49 (5)                               | .000<br>.000        | .520<br>.542          |
| Good mid range to upper RPM torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3000-3400 cruise RPM, 9.0 to 10.75 comp. ratio advised.                            | <b>HR-224/339-2S-12</b>            | 2400-6400             | <b>369601<sup>b,c</sup></b>                      | <b>36532-16<sup>f</sup></b> | 224<br>232                                 | 286<br>294                                    | 112                           | 5 39<br>53 (1)                               | .000<br>.000        | .542<br>.563          |
| <b>Mechanical Lifter Camshafts</b>  |                                    |                       |  |                             |  |   |                               |  |                     |                       |
| Replacement for factory 289 Hi-Po   | <b>BluePrinted<br/>C302-6250-C</b> | 2200-6000             | <b>360901<sup>g</sup></b>                        | <b>99257-16</b>             | 227<br>227                                 | 266<br>266                                    | 114                           | 3.5 43.5<br>51.5 (4.5)                       | .020<br>.024        | .477<br>.477          |
| Good low end & mid range torque & HP, fair idle, moderate performance usage, bracket racing, auto trans w/3000+ converter, 3400-3800 cruise RPM, 10.5 to 11.5 compress. ratio advised, also mild supercharged, nitrous. | <b>F-278-2</b>                     | 2800-6600             | <b>363841<sup>g</sup></b>                        | <b>99257-16</b>             | 238<br>248                                 | 278<br>288                                    | 114                           | 10 48<br>63 5                                | .022<br>.022        | .512<br>.533          |
| Radical street, performance usage, oval track: Late Model, Sportsman, 3/8-1/2 mile, bracket racing: Pro, Pro E.T., Super E.T., auto trans w/race converter; 11.0 to 12.5 compression ratio advised.                     | <b>F-280-2</b>                     | 3200-7000             | <b>364681<sup>g</sup><br/>364682<sup>d</sup></b> | <b>99257-16</b>             | 244<br>252                                 | 280<br>288                                    | 108                           | 16 48<br>56 16                               | .026<br>.026        | .553<br>.572          |
| Performance usage, good mid-range HP, bracket racing, auto trans w/4000+ converter, 11.0 to 12.5 compression ratio advised.   | <b>F-310-2</b>                     | 3600-7400             | <b>364761<sup>g</sup></b>                        | <b>99257-16</b>             | 248<br>258                                 | 310<br>320                                    | 108                           | 21 47<br>62 16                               | .022<br>.022        | .533<br>.555          |
| Performance usage, good mid and upper range HP, oval track, bracket racing, auto trans w/race converter, 11.5 minimum compression ratio advised.  | <b>F-260/3694-6</b>                | 4400-7800             | <b>361421<sup>g</sup></b>                        | <b>99257-16</b>             | 260<br>260                                 | 296<br>296                                    | 106                           | 27 53<br>54 21                               | .000<br>.000        | .591<br>.591          |
| Moderate competition only, good upper RPM HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.  | <b>F-268/394-2S2-8</b>             | 4800-8200             | <b>361591<sup>g</sup></b>                        | <b>99257-16</b>             | 268<br>272                                 | 304<br>302                                    | 108                           | 29 59<br>67 25                               | .018<br>.012        |                       |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller camshafts and lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** Specify if heads with 5/16" valve stems are used. These valve springs and retainers cannot be used with short valve stem heads.

**NOTE:** Ford 221 thru 302 camshafts can be used in 351 Windsor engines if the engine is changed to 221 thru 302 firing order (1-5-4-2-6-3-7-8). Ford 351W firing order is 1-3-7-2-6-5-4-8.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, and in order to effect valve adjustment when using mechanical lifter camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. **For engines equipped with pedestal mounted rocker arms and hydraulic roller lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1).** Refer to page 324 for details.

**IMPORTANT:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (36655-16) for street applications, enabling the 1977-00 255 and 302 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and gear assemblies, a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Left hand rotation mechanical camshafts are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** These camshafts also fit the 1969-70 Ford-Mercury Boss 302 V-8 engines. Some kit components will differ. Contact Crane's Performance Consultants for details.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                 | See pg. 350                                    | See pg. 362                 | See pg. 360  | See pg. 306  | See pg. 328  | See pg. 312  | See pg. 315   | See pg. 317  |
|--------------------------------|-----------------------------|--|-----------------------------|--|--|--|--|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS               | RETAINERS                                      | VALVE STEM SEALS            | VALVE STEM LOCKS   | PUSHRODS   | TIMING CHAIN AND GEAR ASSEMBLY                           | STEEL ROCKER ARMS  | — ALUMINUM CRANE CLASSIC/ENERGIZER  | ROCKERS — GOLD RACE  |
| <b>36308-1<sup>a</sup></b>     | <b>96803-16<sup>a</sup></b> | <b>99946-16</b>                                |                             | <b>99097-1<sup>j</sup></b>                               | <b>36631-16<sup>i</sup></b><br><b>36625-16<sup>m</sup></b> | <b>44975-1<sup>r</sup></b><br><b>44984-1<sup>s</sup></b> | <b>36800-16<sup>i</sup></b><br><b>36801-16<sup>u</sup></b> | <b>36774-16<sup>v</sup></b><br><b>11746-16<sup>w</sup></b><br><b>44746-16<sup>x</sup></b> | <b>36750-16<sup>z</sup></b><br><b>36759-16<sup>z</sup></b><br><b>36758-16<sup>aa</sup></b> |
|                                | <b>96874-16<sup>h</sup></b> | <b>99944-16</b><br><b>99969-16<sup>i</sup></b> | <b>99820-16<sup>h</sup></b> | <b>99097-1<sup>j</sup></b><br><b>99094-1<sup>k</sup></b> | <b>95610-16<sup>q</sup></b><br><b>95614-16<sup>q</sup></b> | <b>44975-1<sup>r</sup></b><br><b>44984-1<sup>s</sup></b> | <b>36800-16<sup>i</sup></b><br><b>36801-16<sup>u</sup></b> | <b>36774-16<sup>v</sup></b><br><b>11746-16<sup>w</sup></b><br><b>44746-16<sup>x</sup></b> | <b>36750-16<sup>z</sup></b><br><b>36759-16<sup>z</sup></b><br><b>36758-16<sup>aa</sup></b> |
|                                | <b>96874-16<sup>h</sup></b> | <b>99944-16</b><br><b>99969-16<sup>i</sup></b> | <b>99820-16<sup>h</sup></b> | <b>99097-1<sup>j</sup></b><br><b>99094-1<sup>k</sup></b> | <b>95610-16<sup>q</sup></b><br><b>95614-16<sup>q</sup></b> | <b>44975-1<sup>r</sup></b><br><b>44984-1<sup>s</sup></b> | <b>36800-16<sup>i</sup></b><br><b>36801-16<sup>u</sup></b> | <b>36774-16<sup>v</sup></b><br><b>11746-16<sup>w</sup></b><br><b>44746-16<sup>x</sup></b> | <b>36750-16<sup>z</sup></b><br><b>36759-16<sup>z</sup></b><br><b>36758-16<sup>aa</sup></b> |
|                                | <b>96803-16<sup>g</sup></b> | <b>99946-16</b>                                |                             | <b>99097-1<sup>j</sup></b>                               | <b>36622-16<sup>p</sup></b><br><b>95618-16<sup>q</sup></b> | <b>44975-1<sup>r</sup></b><br><b>44984-1<sup>s</sup></b> | <b>36800-16<sup>i</sup></b>                                | <b>36774-16<sup>v</sup></b>   | <b>36750-16<sup>z</sup></b><br><b>86757-16<sup>bb</sup></b>                                |
|                                | <b>99893-16<sup>h</sup></b> | <b>99953-16</b><br><b>99969-16<sup>i</sup></b> | <b>99820-16<sup>h</sup></b> | <b>99097-1<sup>j</sup></b><br><b>99094-1<sup>k</sup></b> | <b>36622-16<sup>p</sup></b><br><b>95618-16<sup>q</sup></b> | <b>44975-1<sup>r</sup></b><br><b>44984-1<sup>s</sup></b> | <b>36800-16<sup>i</sup></b>                                | <b>36774-16<sup>v</sup></b>   | <b>36750-16<sup>z</sup></b><br><b>86757-16<sup>bb</sup></b>                                |
|                                | <b>96877-16<sup>h</sup></b> | <b>99943-16</b><br><b>99969-16<sup>i</sup></b> | <b>99820-16<sup>h</sup></b> | <b>99097-1<sup>j</sup></b><br><b>99094-1<sup>k</sup></b> | <b>36622-16<sup>p</sup></b><br><b>95618-16<sup>q</sup></b> | <b>44975-1<sup>r</sup></b><br><b>44984-1<sup>s</sup></b> |  | <b>36774-16<sup>v</sup></b>   | <b>36750-16<sup>z</sup></b><br><b>86757-16<sup>bb</sup></b>                                |
|                                | <b>96877-16<sup>h</sup></b> | <b>99943-16</b><br><b>99969-16<sup>i</sup></b> | <b>99820-16<sup>h</sup></b> | <b>99097-1<sup>j</sup></b><br><b>99094-1<sup>k</sup></b> | <b>36622-16<sup>p</sup></b><br><b>95618-16<sup>q</sup></b> | <b>44975-1<sup>r</sup></b><br><b>44984-1<sup>s</sup></b> |  | <b>36774-16<sup>v</sup></b>   | <b>36750-16<sup>z</sup></b><br><b>86757-16<sup>bb</sup></b>                                |
|                                | <b>96877-16<sup>h</sup></b> | <b>99943-16</b><br><b>99969-16<sup>i</sup></b> | <b>99820-16<sup>h</sup></b> | <b>99097-1<sup>j</sup></b><br><b>99094-1<sup>k</sup></b> | <b>36622-16<sup>p</sup></b><br><b>95618-16<sup>q</sup></b> | <b>44975-1<sup>r</sup></b><br><b>44984-1<sup>s</sup></b> |  | <b>36774-16<sup>v</sup></b>   | <b>36750-16<sup>z</sup></b><br><b>86757-16<sup>bb</sup></b>                                |
| .630                           | <b>96877-16<sup>h</sup></b> | <b>99943-16</b><br><b>99969-16<sup>i</sup></b> | <b>99820-16<sup>h</sup></b> | <b>99097-1<sup>j</sup></b><br><b>99094-1<sup>k</sup></b> | <b>36622-16<sup>p</sup></b><br><b>95618-16<sup>q</sup></b> | <b>44975-1<sup>r</sup></b><br><b>44984-1<sup>s</sup></b> |  | <b>36774-16<sup>v</sup></b>   | <b>36750-16<sup>z</sup></b><br><b>86757-16<sup>bb</sup></b>                                |
| .640                           |                             |  |                             |  |  |  |  |   |  |

- a For 1986-89 (non-H.O.) engines originally equipped with hydraulic roller camshafts.
- b Camshaft has standard base circle diameter, for use with **36532-16** or **36560-16** hydraulic roller lifters.
- c Requires **36970-1** (.467" I.D.), **36971-1** (.500" I.D.), or **44970-1** (.531" I.D. SVO) steel, or **36990-1** (.467" I.D.), **36989-1** (.500" I.D.), or **44990-1** (.531" I.D. SVO), aluminum-bronze distributor drive gear.
- d Cam, lifter, valve spring, and retainer kit, includes installation lubricants.
- e For use with standard Ford alignment bars.
- f Vertical locking bar hydraulic roller lifters, no machining required. Cylinder head removal will be required.
- g Contains standard diameter valve springs, no machining required.
- h Must machine cylinder heads.
- i Requires Crane Multi Fit valve locks.
- j Machined steel, heat treated.
- k Machined steel, heat treated, Multi Fit.
- l For engines with non-adjustable pedestal rocker arms and stock base circle camshafts, heavy wall, heat treated.
- m For engines with non-adjustable pedestal mount rocker arms, heavy wall, heat treated.
- n For engines with adjustable rocker arms with Crane's Pushrod Guideplate Conversion Kit (**36655-16**), heavy wall, heat treated.
- o For engines with non-adjustable bottleneck studs or pedestal mount rocker arms, heavy wall, heat treated.
- p For use with or without pushrod guideplate cylinder heads, heavy wall, heat treated.
- q Pro Series one-piece.
- r For 73-00 engines, performance steel billet gears and roller chain set.
- s For 73-00 engines, Pro Series steel billet gears and roller chain set.
- t 1.6 ratio, cast, non-rail type for 3/8" studs, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- u 1.6 ratio, cast, rail type for 3/8" studs, non-adjustable with 5/16" top bottleneck studs, adjustable with straight 3/8" studs and locking nuts.
- v Crane Classic extruded, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- w Energizer, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- x Energizer, 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- y 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- z 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- aa 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- bb 1.6 ratio, 7/16" stud, must machine 1966-00 cylinder heads and install **99157-16** rocker arm studs and **36650-1** pushrod guideplates.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b><br>Good low end and mid range torque and HP, fair idle, moderate performance usage, off road, bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 10.5 to 11.5 compression ratio advised.  | <b>SR-238/350-2S-12</b>          | 2800-<br>6600         | <b>368511<sup>a,b</sup></b>                | <b>44518-16</b><br><b>44570-16<sup>d</sup></b> | 238  | 288   | 112                           | 12 46  | .020                        | .560                          |
|   |                                  |                       |  |  | 246  | 296   | 60 6                          | .020   | .579                        |                               |
| Fair idle, moderate performance usage, good mid-range torque and HP, bracket racing, good w/manifold nitrous system, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised. Good w/ Roots supercharger, 16 lbs. max. boost w/8.0 max. compression ratio advised. | <b>SR-246/362-2S-10</b>          | 3400-<br>7000         | <b>368601<sup>a,b</sup></b>                | <b>44518-16</b><br><b>44570-16<sup>d</sup></b> | 246  | 296   | 110                           | 18 48  | .020                        | .579                          |
|   |                                  |                       |  |  | 254  | 304   | 62 12                         | .020   | .598                        |                               |
| Good mid range torque and HP, radical street, rough idle, performance usage, oval track, bracket racing, auto trans w/race converter, 11.0 to 12.5 compression ratio advised.   | <b>R-252/420-2S-8</b>            | 3600-<br>7400         | <b>448801<sup>a,b,c</sup></b>              | <b>44518-16</b><br><b>44570-16<sup>d</sup></b> | 252  | 284   | 108                           | 22 50  | .020                        | .672                          |
|   |                                  |                       |  |  | 258  | 290   | 61 17                         | .020   | .672                        |                               |
| Good mid range to upper RPM torque and HP, 302+ cu. in., rough idle, performance usage, oval track, bracket racing, auto trans w/race converter, 11.5 minimum compression ratio advised.  | <b>R-258/420-2S-8</b>            | 3800-<br>7600         | <b>448831<sup>a,b,c</sup></b>              | <b>44518-16</b><br><b>44570-16<sup>d</sup></b> | 258  | 290   | 108                           | 25 53  | .020                        | .672                          |
|   |                                  |                       |  |  | 262  | 294   | 63 19                         | .020   | .672                        |                               |
| Performance usage, good mid to upper RPM HP, 302+ cu.in., long oval track, bracket racing, auto trans w/race converter, 12.0 minimum compression ratio advised.   | <b>R-262/420-2S3-8</b>           | 4200-<br>7800         | <b>448841<sup>a,b,c</sup></b>              | <b>44518-16</b><br><b>44570-16<sup>d</sup></b> | 262  | 294   | 108                           | 27 55  | .020                        | .672                          |
|   |                                  |                       |  |  | 268  | 300   | 66 22                         | .020   | .672                        |                               |
| Competition only, good upper RPM HP, 302+ cu.in., bracket racing, Heavy, Street, etc., auto trans w/race converter, aftermarket aluminum cylinder heads advised, 12.5 minimum compression ratio advised.  | <b>R-268/420-2S1-8</b>           | 4800-<br>8200         | <b>448851<sup>a,b,c</sup></b>              | <b>44518-16</b><br><b>44570-16<sup>d</sup></b> | 268  | 300   | 108                           | 30 58  | .020                        | .672                          |
|   |                                  |                       |  |  | 272  | 304   | 68 24                         | .020   | .672                        |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller camshafts and lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** Specify if heads with 5/16" valve stems are used. These valve springs and retainers cannot be used with short valve stem heads.

**NOTE:** Ford 221 thru 302 camshafts can be used in 351 Windsor engines if the engine is changed to 221 thru 302 firing order (1-5-4-2-6-3-7-8). Ford 351W firing order is 1-3-7-2-6-5-4-8.

**NOTE:** To effect valve adjustment when using roller lifter camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped).

**IMPORTANT:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (36655-16) for street applications, enabling the 1977-00 255 and 302 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and gear assemblies, a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** These camshafts also fit the 1969-70 Ford-Mercury Boss 302 V-8 engines. Some kit components will differ. Contact Crane's Performance Consultants for details.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360          | See pg. 306                                    | See pg. 328                                  | See pg. 312       | See pg. 315   | See pg. 317                                    |
|--------------------------------|-----------------------|-------------|-----------------------|----------------------|--|--|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 99893-16              | 99953-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>f</sup> | 36622-16 <sup>g</sup><br>95618-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> |                   | 36774-16 <sup>k</sup>                               | 36750-16 <sup>l</sup><br>86757-16 <sup>m</sup> |
|                                | 99893-16              | 99953-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>f</sup> | 36622-16 <sup>g</sup><br>95618-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> |                   | 36774-16 <sup>k</sup>                               | 36750-16 <sup>l</sup><br>86757-16 <sup>m</sup> |
|                                | 99885-16 <sup>e</sup> | 99956-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>f</sup> | 36622-16 <sup>g</sup><br>95618-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> |                   | 36774-16 <sup>k</sup>                               | 36750-16 <sup>l</sup><br>86757-16 <sup>m</sup> |
|                                | 99885-16 <sup>e</sup> | 99956-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>f</sup> | 36622-16 <sup>g</sup><br>95618-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> |                   | 36774-16 <sup>k</sup>                               | 36750-16 <sup>l</sup><br>86757-16 <sup>m</sup> |
|                                | 99885-16 <sup>e</sup> | 99956-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>f</sup> | 36622-16 <sup>g</sup><br>95618-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> |                   | 36774-16 <sup>k</sup>                               | 36750-16 <sup>l</sup><br>86757-16 <sup>m</sup> |
|                                | 99885-16 <sup>e</sup> | 99956-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>f</sup> | 36622-16 <sup>g</sup><br>95618-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> |                   | 36774-16 <sup>k</sup>                               | 36750-16 <sup>l</sup><br>86757-16 <sup>m</sup> |

- a Requires 36970-1 (.467" I.D.), 36971-1 (.500" I.D.), or 44970-1 (.531" I.D. SVO) steel, or 36990-1 (.467" I.D.), 36989-1 (.500" I.D.), or 44990-1 (.531" I.D. SVO), aluminum-bronze distributor drive gear.
- b Requires 7/16-20 x 1-1/4" grade 8 cam gear bolt and hardened washer.
- c Camshaft has 351W firing order: 1-3-7-2-6-5-4-8
- d Ultra Pro Series roller lifters.
- e Must machine cylinder heads.
- f Machined steel, heat treated.
- g For use with or without pushrod guideplate cylinder heads, heavy wall, heat treated.
- h Pro Series one-piece.
- i For 73-00 engines, performance steel billet gears and roller chain set.
- j For 73-00 engines, Pro Series steel billet gears and roller chain set.

- k Crane Classic extruded, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install 99156-16 rocker arm studs and 36650-1 pushrod guideplates, or use 36655-16 Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- l 1.6 ratio, 3/8" stud, must machine 1966-00 cylinder heads and install 99156-16 rocker arm studs and 36650-1 pushrod guideplates, or use 36655-16 Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- m 1.6 ratio, 7/16" stud, must machine 1966-00 cylinder heads and install 99157-16 rocker arm studs and 36650-1 pushrod guideplates.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b>   |                                  |                       |  |                       |  |   |                               |  |                             |                               |
| Good low to mid-range torque and HP, for speed density (or mass airflow) style F.I., good idle, daily usage works w/auto or 4/5 speed manual and stock rear end gears, 2200-2600 cruise RPM, (50 state legal 85-93, C.A.R.B. E.O. D-225-46). Good w/centrifugal or small Roots supercharger, with speed density (of mass airflow) style F.I., 8 lbs. maximum boost w/stock 9.2 compression ratio advised, and good w/SEFI-type nitrous system, with speed density (or mass airflow) style F.I., stock 9.2 compression ratio advised.  | 2020                             | 1000-<br>5000         | 444211                                     | 36530-16 <sup>b</sup> | 208  | 262   | 112                           | (3) 31                                       | .000                        | .530                          |
|   |                                  |                       | 444212 <sup>a</sup>                        | 36532-16 <sup>c</sup> | 216  | 270   | 45 (9)                        | .000   | .530                        |                               |
| Good mid-range torque and HP, good idle, daily usage, designed for use with 1.7 ratio rockers and mass airflow style F.I. engines with aftermarket intake, heads, exhaust, 5-speed or auto w/mild stall converter, 2400-2800 cruise RPM, (50 state legal 85-93, C.A.R.B. E.O. D-225-46). Good w/centrifugal or small Roots supercharger, with mass airflow style F.I., 10 lbs. maximum boost w/8.5 maximum compression ratio advised, and good w/SEFI-type nitrous system, with mass airflow style F.I., stock 9.2 compression ratio advised.   | 2031                             | 1400-<br>5400         | 444225                                     | 36530-16 <sup>b</sup> | 214  | 276   | 112                           | 0 34   | .000                        | .513 <sup>d</sup>             |
|   |                                  |                       | 444226 <sup>a</sup>                        | 36532-16 <sup>c</sup> | 220  | 282   | 47 (7)                        | .000   | .529 <sup>d</sup>           |                               |
| Delivers mid-range torque and HP, good idle, daily usage, requires mass airflow style F.I. for best idle control, works w/4/5 speed manual or auto, may require higher stall converter, use with 3.08 or numerically higher rear gears, 2400-2800 cruise RPM, (50 state legal 85-93, C.A.R.B. E.O. D-225-46) Basic RPM 2000-5500. Good w/centrifugal or small Roots supercharger, with mass airflow style F.I., 10 lbs maximum boost w/8.5 maximum compression ratio advised, and good w/SEFI-type nitrous system, with mass airflow style F.I., stock 9.2 compression ratio advised. | 2030                             | 1400-<br>5400         | 444221                                     | 36530-16 <sup>b</sup> | 216  | 270   | 112                           | 1 35   | .000                        | .533                          |
|   |                                  |                       | 444222 <sup>a</sup>                        | 36532-16 <sup>c</sup> | 220  | 278   | 47 (7)                        | .000   | .544                        |                               |
| Good low end torque and HP, good idle, daily usage, performance and fuel efficiency, off road, towing, 2400-3000 cruise RPM, 8.75 to 10.0 compression ratio advised.  | HR-216/325-2S-12                 | 1400-<br>5400         | 449541 <sup>*</sup>                        | 36530-16 <sup>b</sup> | 216  | 278   | 112                           | 1 35   | .000                        | .520                          |
|   |                                  |                       |  | 36532-16 <sup>c</sup> | 224  | 286   | 49 (5)                        | .000   | .542                        |                               |
| Good mid-range and strong top-end power, E303 replacement, requires modified mass airflow, aftermarket intake, performance cylinder heads and headers, must use 5-speed and 3.55 or numerically higher rear gears, 2600-3000 cruise RPM, (50 state legal 85-93, C.A.R.B. E.O. D-225-46). Good w/centrifugal or Roots supercharger, 15 lbs. maximum boost w/8.0 maximum compression ratio advised, and good w/SEFI-type nitrous system, with mass airflow style F.I., stock 9.2 comp. ratio advised.   | 2040                             | 1800-<br>5800         | 444231                                     | 36530-16 <sup>b</sup> | 220  | 282   | 110                           | 0 40   | .000                        | .498                          |
|   |                                  |                       |  | 36532-16 <sup>c</sup> | 220  | 282   | 40 0                          | .000   | .498                        |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. For engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (36655-16) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. See page 305 for ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>                | <i>See pg. 350</i>                            | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>  | <i>See pg. 328</i>                           | <i>See pg. 312</i> | <i>See pg. 315</i>  | <i>See pg. 317</i>  |
|--------------------------------|-----------------------------------|---|-----------------------|--|---|--|--------------------|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                     | RETAINERS                                     | VALVE STEM SEALS      | VALVE STEM LOCKS   | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER                     | GOLD RACE   |
| 44308-1 <sup>e</sup>           | 99841-16                          | 99942-16                                      |                       | <sup>h</sup>   | 36631-16 <sup>k</sup><br>36625-16 <sup>l</sup><br>95608-16 <sup>l,m</sup> | 44975-1 <sup>n</sup><br>44984-1 <sup>o</sup> |                    | 44774-16 <sup>p</sup><br>36774-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36759-16 <sup>s</sup><br>36758-16 <sup>t</sup><br>36750-16 <sup>u</sup> |
| 44308-1 <sup>e</sup>           | 99841-16                          | 99942-16                                      |                       | <sup>h</sup>   | 36631-16 <sup>k</sup><br>36625-16 <sup>l</sup><br>95608-16 <sup>l,m</sup> | 44975-1 <sup>n</sup><br>44984-1 <sup>o</sup> |                    | 44774-16 <sup>p</sup><br>36774-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36759-16 <sup>s</sup><br>36758-16 <sup>t</sup><br>36750-16 <sup>u</sup> |
| 44308-1 <sup>e</sup>           | 99841-16                          | 99942-16                                      |                       | <sup>h</sup>   | 36631-16 <sup>k</sup><br>36625-16 <sup>l</sup><br>95608-16 <sup>l,m</sup> | 44975-1 <sup>n</sup><br>44984-1 <sup>o</sup> |                    | 44774-16 <sup>p</sup><br>36774-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36759-16 <sup>s</sup><br>36758-16 <sup>t</sup><br>36750-16 <sup>u</sup> |
|                                | 96870-16 <sup>f</sup>             | 99943-16<br>99969-16 <sup>g</sup>             | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>j</sup>                 | 36631-16 <sup>k</sup><br>36625-16 <sup>l</sup><br>95608-16 <sup>l,m</sup> | 44975-1 <sup>n</sup><br>44984-1 <sup>o</sup> |                    | 44774-16 <sup>p</sup><br>36774-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36759-16 <sup>s</sup><br>36758-16 <sup>t</sup><br>36750-16 <sup>u</sup> |
| 44308-1 <sup>e</sup>           | 99841-16<br>96870-16 <sup>f</sup> | 99942-16<br>99943-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>f</sup> | <sup>h</sup><br>99097-1 <sup>i</sup><br>99087-1 <sup>j</sup> | 36631-16 <sup>k</sup><br>36625-16 <sup>l</sup><br>95608-16 <sup>l,m</sup> | 44975-1 <sup>n</sup><br>44984-1 <sup>o</sup> |                    | 44774-16 <sup>p</sup><br>36774-16 <sup>q</sup><br>44746-16 <sup>r</sup> | 36759-16 <sup>s</sup><br>36758-16 <sup>t</sup><br>36750-16 <sup>u</sup> |

**Section Continued**

- a** Cam and spring kit, includes **44308-1** kit, containing valve springs, valve spring retainers, and valve stem locks.
- b** For use with standard Ford alignment bars.
- c** Vertical locking bar hydraulic roller lifters, no machining required. Cylinder head removal required for installation in 302 and 302 H.O. applications.
- d** Gross valve lift with 1.7 ratio rocker arms.
- e** Includes standard diameter valve springs (**99841-16**), valve spring retainers (**99942-16**), and valve stem locks (**99094** and **99097**). No machining required.
- f** Must machine cylinder heads.
- g** Requires Crane Multi Fit valve stem locks.
- h** Included in **44308-1** valve spring and retainer kit.
- i** Machined steel, heat treated.
- j** Machined steel, heat treated, Multi Fit.
- k** For engines with non-adjustable pedestal mount rocker arms, heavy wall, heat treated.
- l** For 302 H.O. engines with adjustable rocker arms with Pushrod Guideplate Conversion Kit (**36655-16**), heavy wall, heat treated. See page 325 for details.
- m** Pro Series one-piece.
- n** Performance steel billet gears and roller chain set.
- o** Pro Series steel billet gears and roller chain set.
- p** Crane Classic extruded, 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required.
- q** Crane Classic extruded, 1.6 ratio, 3/8" stud, must machine cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on pedestal mount cylinder heads for street applications.
- r** Energizer 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- s** 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- t** 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- u** 1.6 ratio, 3/8" stud, must machine cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on pedestal mount cylinder heads for street applications.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|---|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|---------------------|-----------------------|
| Good mid-range torque and HP, fair idle, moderate performance usage, for use with 1.7 ratio rocker arms, bracket racing, auto trans w/2500+ converter. Good w/centrifugal or Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised, and/or nitrous, 2500-3600 cruise RPM, 8.75 to 10.5 compression ratio advised.   | HR-220/311-2S-14                 | 2000-6000             | 449591*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 220  | 282   | 114                           | 1 39   | .000                | .529 <sup>c</sup>     |
|   |                                  |                       |  |  | 226  | 288   | 52 (6)                        | .000   | .544 <sup>c</sup>   |                       |
| Good mid range torque and HP, fair idle, moderate performance usage, 2600-3200 cruise RPM, good w/plate nitrous system, auto trans w/2500+ converter, 9.0 to 10.5 compression ratio advised. Also good w/supercharger, 20 lbs. maximum boost w/ 8.5 maximum compression ratio advised.  | HR-220/332-2S2-14                | 2000-6200             | 449631*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 220  | 282   | 114                           | 1 39   | .000                | .531                  |
|   |                                  |                       |  |  | 228  | 290   | 53 (5)                        | .000   | .552                |                       |
| Good mid range and upper RPM torque and HP, fair idle, performance usage, B303 upgrade, X303 replacement, bracket racing, auto trans with 2500+ converter, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.  | HR-224/339-12                    | 2200-6000             | 449661*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 224  | 286   | 112                           | 5 39   | .000                | .542                  |
|   |                                  |                       |  |  | 224  | 286   | 49 (5)                        | .000   | .542                |                       |
| Good mid range to upper RPM torque and HP, fair idle, moderate performance usage, good for use with 1.7 rocker arms, mild bracket racing, auto trans with 2500+ converter, 3000-3400 cruise RPM, 9.0 to 10.75 compression ratio advised. Good w/centrifugal or Roots supercharger, 18 lbs. maximum boost w/8.0 maximum compression ratio advised, and good with SEFI-type or manifold nitrous system. | HR-224/339-2S2-12                | 1400-5400             | 449671*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 224  | 286   | 112                           | 5 39   | .000                | .576 <sup>c</sup>     |
|   |                                  |                       |  |  | 232  | 294   | 53 (1)                        | .000   | .559 <sup>c</sup>   |                       |
| Good mid range to upper RPM torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans with 2500+ converter, 3000-3400 cruise RPM, 9.0 to 10.75 compression ratio advised. Good w/centrifugal or Roots supercharger, 18 lbs. maximum boost w/8.0 maximum compression ratio advised, and good with SEFI-type or manifold nitrous system.                                    | HR-224/339-2S-12                 | 2400-6400             | 449601*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 224  | 286   | 112                           | 5 39   | .000                | .542                  |
|   |                                  |                       |  |  | 232  | 294   | 53 (1)                        | .000   | .563                |                       |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On

engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. For engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (36655-16) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. See page 305 for ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306  | See pg. 328                                  | See pg. 312       | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|--|--|-------------------|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS   | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER                     | GOLD RACE   |
|                                | 96870-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 36631-16 <sup>h</sup><br>36625-16 <sup>i</sup><br>95608-16 <sup>ij</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 44774-16 <sup>m</sup><br>36774-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36759-16 <sup>p</sup><br>36758-16 <sup>q</sup><br>36750-16 <sup>r</sup> |
|                                | 96870-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 36631-16 <sup>h</sup><br>36625-16 <sup>i</sup><br>95608-16 <sup>ij</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 44774-16 <sup>m</sup><br>36774-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36759-16 <sup>p</sup><br>36758-16 <sup>q</sup><br>36750-16 <sup>r</sup> |
|                                | 96870-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 36631-16 <sup>h</sup><br>36625-16 <sup>i</sup><br>95608-16 <sup>ij</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 44774-16 <sup>m</sup><br>36774-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36759-16 <sup>p</sup><br>36758-16 <sup>q</sup><br>36750-16 <sup>r</sup> |
|                                | 96870-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 36631-16 <sup>h</sup><br>36625-16 <sup>i</sup><br>95608-16 <sup>ij</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 44774-16 <sup>m</sup><br>36774-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36759-16 <sup>p</sup><br>36758-16 <sup>q</sup><br>36750-16 <sup>r</sup> |
|                                | 96870-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 36631-16 <sup>h</sup><br>36625-16 <sup>i</sup><br>95608-16 <sup>ij</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 44774-16 <sup>m</sup><br>36774-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36759-16 <sup>p</sup><br>36758-16 <sup>q</sup><br>36750-16 <sup>r</sup> |

Section Continued

- a For use with standard Ford alignment bars.
- b Vertical locking bar hydraulic roller lifters, no machining required. Cylinder head removal required for installation in 302 and 302 H.O. applications.
- c Gross valve lift with 1.7 ratio rocker arms.
- d Must machine cylinder heads.
- e Requires Crane Multi Fit valve stem locks.
- f Machined steel, heat treated.
- g Machined steel, heat treated, Multi Fit.
- h For engines with non-adjustable pedestal mount rocker arms, heavy wall, heat treated.
- i For 302 H.O. engines with adjustable rocker arms with Pushrod Guideplate Conversion Kit (36655-16), heavy wall, heat treated. See page 325 for details.
- j Pro Series one-piece.
- k Performance steel billet gears and roller chain set.
- l Pro Series steel billet gears and roller chain set.
- m Crane Classic extruded, 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required.
- n Crane Classic extruded, 1.6 ratio, 3/8" stud, must machine cylinder heads and install 99156-16 rocker arm studs and 36650-1 pushrod guideplates, or use 36655-16 Conversion Kit on pedestal mount cylinder heads for street applications.
- o Energizer 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- p 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- q 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- r 1.6 ratio, 3/8" stud, must machine cylinder heads and install 99156-16 rocker arm studs and 36650-1 pushrod guideplates, or use 36655-16 Conversion Kit on pedestal mount cylinder heads for street applications.

## COMPLETE CAM SPECIFICATIONS

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | See pg. 294<br>LIFTERS                         | Degrees             | Advertised           | Degrees            | Open/Close                     | Lash                | Gross                |
|--|----------------------------------|-----------------------|--|--|---------------------|----------------------|--------------------|--------------------------------|---------------------|----------------------|
|  |                                  |                       |  |  | Duration<br>@ .050" | Duration<br>Int/Exh. | Lobe<br>Separation | @ .050"<br>Cam Lift<br>Int/Exh | Hot<br>Int.<br>Exh. | Lift<br>Int.<br>Exh. |
| Good mid range to upper RPM torque and HP, fair idle, normally used with 1.7 rocker arms, moderate performance usage, F303 upgrade, bracket racing, auto trans with 3000 converter, 3200-3600 cruise RPM, good with 347+ cu.in., 8.5 to 11.0 compression ratio advised. Good w/centrifugal or Roots supercharger, 22 lbs. maximum boost w/8.0 maximum compression ratio advised, also good with manifold nitrous system. | HR-226/320-2S-14                 | 2600-6600             | 449651*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 226                 | 288                  | 114                | 4 42                           | .000                | .544 <sup>c</sup>    |
|  |                                  |                       |  |  | 232                 | 294                  | 55 (3)             | .000                           | .559 <sup>c</sup>   |                      |
| Good mid to upper RPM torque and HP, fair idle, performance usage, Z303 upgrade, bracket racing, auto trans with 3000+ converter, 3400-3800 cruise RPM, good with 347+ cu.in., with modified intake and cylinder heads, 10.0 to 11.5 compression ratio advised. Good w/centrifugal or Roots supercharger, 24 lbs. maximum boost with 8.5 maximum compression ratio advised, also good with manifold nitrous system.      | HR-228/345-2S1-14                | 2600-6600             | 449681*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 228                 | 290                  | 114                | 5 43                           | .000                | .552                 |
|  |                                  |                       |  |  | 232                 | 249                  | 55 (3)             | .000                           | .563                |                      |
| Good upper RPM torque and HP, fair idle performance usage, bracket racing, auto w/3000+ converter, 3600-4000 cruise RPM, suitable for upper RPM with 347+ cu. in. with upgraded intake system and cylinder heads, 10.25 to 12.0 compression ratio advised. Good w/large centrifugal or Roots supercharger, 24 lbs. maximum boost with 9.0 maximum compression ratio, also good with large manifold nitrous system.       | HR-228/345-2S-14                 | 2600-6600             | 449691*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 228                 | 290                  | 114                | 5 93                           | .000                | .552                 |
|  |                                  |                       |  |  | 236                 | 298                  | 57 (1)             | .000                           | .574                |                      |
| Good upper RPM torque and HP, fair idle, performance usage, bracket racing, auto w/3000+ converter, 3400-4000 cruise RPM, 10.0 to 11.5 compression ratio advised, best with 347+ cu.in.. Good w/Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised, also good with SEFI-type or manifold nitrous system.  | HR-232/352-2S-12                 | 2800-6800             | 449761*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 232                 | 294                  | 112                | 9 43                           | .000                | .563                 |
|  |                                  |                       |  |  | 244                 | 306                  | 59 5               | .000                           | .595                |                      |
| Good mid to upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3000+ converter, 3600-4000 cruise RPM, 10.5 to 12.0 compression ratio advised, best with 331+ cu.in.  | HR-236/359-2S-10                 | 2800-6800             | 449641*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 236                 | 298                  | 110                | 13 43                          | .000                | .574                 |
|  |                                  |                       |  |  | 244                 | 306                  | 57 7               | .000                           | .595                |                      |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. For engines equipped with pedestal mounted rocker arms

and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (36655-16) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. See page 305 for ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306  | See pg. 328                                  | See pg. 312       | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|--|--|-------------------|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS   | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER                     | GOLD RACE   |
|                                | 96870-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 36631-16 <sup>h</sup><br>36625-16 <sup>i</sup><br>95608-16 <sup>ij</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 44774-16 <sup>m</sup><br>36774-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36759-16 <sup>p</sup><br>36758-16 <sup>q</sup><br>36750-16 <sup>r</sup> |
|                                | 96870-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 36631-16 <sup>h</sup><br>36625-16 <sup>i</sup><br>95608-16 <sup>ij</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 44774-16 <sup>m</sup><br>36774-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36759-16 <sup>p</sup><br>36758-16 <sup>q</sup><br>36750-16 <sup>r</sup> |
|                                | 96870-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 36631-16 <sup>h</sup><br>36625-16 <sup>i</sup><br>95608-16 <sup>ij</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 44774-16 <sup>m</sup><br>36774-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36759-16 <sup>p</sup><br>36758-16 <sup>q</sup><br>36750-16 <sup>r</sup> |
|                                | 96870-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 36631-16 <sup>h</sup><br>36625-16 <sup>i</sup><br>95608-16 <sup>ij</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 44774-16 <sup>m</sup><br>36774-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36759-16 <sup>p</sup><br>36758-16 <sup>q</sup><br>36750-16 <sup>r</sup> |
|                                | 96870-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 36631-16 <sup>h</sup><br>36625-16 <sup>i</sup><br>95608-16 <sup>ij</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 44774-16 <sup>m</sup><br>36774-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36759-16 <sup>p</sup><br>36758-16 <sup>q</sup><br>36750-16 <sup>r</sup> |

**Section Continued**

- a For use with standard Ford alignment bars.
- b Vertical locking bar hydraulic roller lifters, no machining required. Cylinder head removal required for installation in 302 and 302 H.O. applications.
- c Gross valve lift with 1.7 ratio rocker arms.
- d Must machine cylinder heads.
- e Requires Crane Multi Fit valve stem locks.
- f Machined steel, heat treated.
- g Machined steel, heat treated, Multi Fit.
- h For engines with non-adjustable pedestal mount rocker arms, heavy wall, heat treated.
- i For 302 H.O. engines with adjustable rocker arms with Pushrod Guideplate Conversion Kit (36655-16), heavy wall, heat treated. See page 325 for details.
- j Pro Series one-piece.
- k Performance steel billet gears and roller chain set.
- l Pro Series steel billet gears and roller chain set.
- m Crane Classic extruded, 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required.
- n Crane Classic extruded, 1.6 ratio, 3/8" stud, must machine cylinder heads and install 99156-16 rocker arm studs and 36650-1 pushrod guideplates, or use 36655-16 Conversion Kit on pedestal mount cylinder heads for street applications.
- o Energizer 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- p 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- q 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- r 1.6 ratio, 3/8" stud, must machine cylinder heads and install 99156-16 rocker arm studs and 36650-1 pushrod guideplates, or use 36655-16 Conversion Kit on pedestal mount cylinder heads for street applications.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts</b>  |                                  |                       |  |  |  |   |                               |  |                             |                               |
| Rough idle, performance usage, good upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, also supercharged and/or nitrous, 10.0 to 11.5 compression ratio advised.   | HR-236/359-2S-14                 | 3000-7000             | 449811*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 236  | 298   | 114                           | 9 47   | .000                        | .574                          |
|  |                                  |                       |  |  | 244  | 306   | 61 3                          | .000   | .595                        |                               |
| Moderate performance usage, rough idle, bracket racing, auto trans w/3500+ converter, good w/manifold nitrous system, 10.5 to 12.0 compression ratio advised. Also good w/centrifugal or Roots supercharger, 28 lbs. maximum boost w/8.5 maximum compression ratio.                            | HR-240/365-2S1-14                | 3200-7000             | 449711*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 240  | 302   | 114                           | 11 49  | .000                        | .584                          |
|  |                                  |                       |  |  | 244  | 306   | 61 3                          | .000   | .595                        |                               |
| Good high RPM HP, rough idle, competition usage, bracket racing, auto w/race converter, 347+ cu.in., 11.5 minimum compression ratio advised.   | HR-244/372-2S-10                 | 3400-7000             | 449581*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 244  | 306   | 110                           | 17 47  | .000                        | .595                          |
|  |                                  |                       |  |  | 256  | 318   | 63 13                         | .000   | .595                        |                               |
| Good high RPM HP, rough idle, competition usage, bracket racing, auto w/race converter, 347+ cu.in., 12.0 minimum compression ratio advised. Also good for mild supercharged or mild nitrous.  | HR-244/372-2S-12                 | 3600-7000             | 449571*                                    | 36530-16 <sup>a</sup><br>36532-16 <sup>b</sup> | 244  | 306   | 112                           | 15 49  | .000                        | .595                          |
|  |                                  |                       |  |  | 256  | 318   | 65 11                         | .000   | .595                        |                               |
| Performance usage, for 347+ cu.in., NMRA, good w/ large plate nitrous, aftermarket aluminum cylinder heads advised, auto trans w/race converter, 13.0 minimum compression ratio advised. Also good w/centrifugal or Roots supercharger, 34 lbs. maximum boost w/8.5 maximum compression ratio. | HR-252/400-2S-14                 | 3800-7200             | 449741*                                    | 36532-16 <sup>b</sup>                          | 252  | 322   | 114                           | 15.5 56.5                                    | .000                        | .640                          |
|  |                                  |                       |  |  | 260  | 330   | 68 12                         | .000   | .640                        |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the heads must be machined to accept

screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. For engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (36655-16) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Special length pushrods can be ordered to provide proper

hydraulic lifter preload. See page 305 for ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328                                  | See pg. 312       | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|---|--|-------------------|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER                     | GOLD RACE   |
|                                | 96870-16 <sup>c</sup> | 99943-16<br>99969-16 <sup>d</sup> | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 36631-16 <sup>g</sup><br>36625-16 <sup>h</sup><br>95608-16 <sup>h,i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 44774-16 <sup>l</sup><br>36774-16 <sup>m</sup><br>44746-16 <sup>n</sup> | 36759-16 <sup>o</sup><br>36758-16 <sup>p</sup><br>36750-16 <sup>q</sup> |
|                                | 96870-16 <sup>c</sup> | 99943-16<br>99969-16 <sup>d</sup> | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 36631-16 <sup>g</sup><br>36625-16 <sup>h</sup><br>95608-16 <sup>h,i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 44774-16 <sup>l</sup><br>36774-16 <sup>m</sup><br>44746-16 <sup>n</sup> | 36759-16 <sup>o</sup><br>36758-16 <sup>p</sup><br>36750-16 <sup>q</sup> |
|                                | 96870-16 <sup>c</sup> | 99943-16<br>99969-16 <sup>d</sup> | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 36631-16 <sup>g</sup><br>36625-16 <sup>h</sup><br>95608-16 <sup>h,i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 44774-16 <sup>l</sup><br>36774-16 <sup>m</sup><br>44746-16 <sup>n</sup> | 36759-16 <sup>o</sup><br>36758-16 <sup>p</sup><br>36750-16 <sup>q</sup> |
|                                | 96870-16 <sup>c</sup> | 99943-16<br>99969-16 <sup>d</sup> | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 36631-16 <sup>g</sup><br>36625-16 <sup>h</sup><br>95608-16 <sup>h,i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>m</sup><br>44746-16 <sup>n</sup>                          | 36759-16 <sup>o</sup><br>36758-16 <sup>p</sup><br>36750-16 <sup>q</sup> |
|                                | 96870-16 <sup>c</sup> | 99943-16<br>99969-16 <sup>d</sup> | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 36631-16 <sup>g</sup><br>36625-16 <sup>h</sup><br>95608-16 <sup>h,i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>m</sup><br>44746-16 <sup>n</sup>                          | 36759-16 <sup>o</sup><br>36758-16 <sup>p</sup><br>36750-16 <sup>q</sup> |

- a For use with standard Ford alignment bars.
- b Vertical locking bar hydraulic roller lifters, no machining required. Cylinder head removal required for installation in 302 and 302 H.O. applications.
- c Must machine cylinder heads.
- d Requires Crane Multi Fit valve stem locks.
- e Machined steel, heat treated.
- f Machined steel, heat treated, Multi Fit.
- g For engines with non-adjustable pedestal mount rocker arms, heavy wall, heat treated.
- h For 302 H.O. engines with adjustable rocker arms with Pushrod Guideplate Conversion Kit (36655-16), heavy wall, heat treated. See page 325 for details.
- i Pro Series one-piece.
- j Performance steel billet gears and roller chain set.
- k Pro Series steel billet gears and roller chain set.
- l Crane Classic extruded, 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required.
- m Crane Classic extruded, 1.6 ratio, 3/8" stud, must machine cylinder heads and install 99156-16 rocker arm studs and 36650-1 pushrod guideplates, or use 36655-16 Conversion Kit on pedestal mount cylinder heads for street applications.
- n Energizer 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- o 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- p 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- q 1.6 ratio, 3/8" stud, must machine cylinder heads and install 99156-16 rocker arm studs and 36650-1 pushrod guideplates, or use 36655-16 Conversion Kit on pedestal mount cylinder heads for street applications.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code   | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |                 |  |   |                               |  |                             |                               |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.  | <b>H-192/2667-2S-10</b>          | 800-4200              | <b>440501*</b>                               | <b>99280-16</b> | 192<br>204                                 | 248<br>260                                    | 110                           | (9) 21<br>37 (13)                            | .000<br>.000                | .427<br>.456                  |
|  |                                  |                       | ❖  |                 |  |   |                               |  |                             |                               |
| Great low end torque and HP, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, marine application: primarily used in 302 cu.in. (firing order change required) and 351W cu.in. near-stock engines for mild performance applications in heavy boats, O.K. for through-prop exhaust, 8.0 to 9.5 compression ratio advised. (50 state legal, pre-computer, C.A.R.B. E.O. D-225-32).  | <b>H-260-2</b>                   | 1200-4800             | <b>443901</b><br><b>443902<sup>a</sup></b>   | <b>99280-16</b> | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000                | .456<br>.484                  |
|  |                                  |                       | ❖  |                 |  |   |                               |  |                             |                               |
| Good mid-range and top end torque and HP, works well with most engine modifications, for non-roller equipped 351 cu.in. Lightning trucks with speed density (or mass airflow) style F.I.   | <b>2030</b>                      | 1400-5200             | <b>444232<sup>ab</sup></b>                   | <b>99280-16</b> | 206<br>214                                 | 268<br>276                                    | 114                           | (6) 32<br>46 (12)                            | .000<br>.000                | .448<br>.464                  |
|  |                                  |                       | ❖  |                 |  |   |                               |  |                             |                               |
| Great low end torque and HP, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, marine application: primarily used in 302 cu.in. (firing order change required) and 351W cu.in. near-stock engines for mild performance applications in heavy boats, O.K. for through-prop exhaust, 8.0 to 9.5 compression ratio advised.  | <b>Z-256-2</b>                   | 1200-5000             | <b>443501*</b><br><b>443502<sup>ab</sup></b> | <b>99280-16</b> | 206<br>212                                 | 256<br>262                                    | 112                           | (4) 30<br>43 (11)                            | .000<br>.000                | .461<br>.475                  |
|  |                                  |                       | ❖  |                 |  |   |                               |  |                             |                               |
| Good low end and mid range torque, good idle, daily usage, off road, fuel efficiency plus performance, 2600-3000 cruise RPM, 8.75 to 10.0 compression ratio advised.   | <b>Energizer<br/>272 H10</b>     | 1600-5200             | <b>18005*</b><br><b>180052<sup>a</sup></b>   | <b>99280-16</b> | 216<br>216                                 | 272<br>272                                    | 110                           | 3 33<br>43 (7)                               | .000<br>.000                | .484<br>.484                  |
|  |                                  |                       | ❖  |                 |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, good idle, daily usage, off road, towing, economy, performance and fuel efficiency, 2600-3000 cruise RPM, marine application: primarily used in 351W cu.in. near-stock to mildly modified engines for mild performance applications in light boats, O.K. for through-prop exhaust, 8.75 to 10.0 compression ratio advised. Good w/centrifugal or small Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised, good for plate nitrous system. (50 state legal, pre-computer C.A.R.B. E.O. D-225-32). | <b>H-272-2</b>                   | 1800-5400             | <b>443941</b><br><b>443942<sup>b</sup></b>   | <b>99280-16</b> | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000                | .484<br>.512                  |
|  |                                  |                       | ❖  |                 |  |   |                               |  |                             |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using **99768-**

16 positive locking nuts will permit valve adjustment. For engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (**99170-1**). Refer to page 324 for details.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (**36655-16**) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. See page 305 for ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our **44975-1** or **44984-1** timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Left hand rotation hydraulic camshafts are available on special order. Contact Crane's Performance Consultants for details.

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**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>    | <i>See pg. 350</i> | <i>See pg. 362</i> | <i>See pg. 360</i>   | <i>See pg. 306</i>                             | <i>See pg. 328</i>             | <i>See pg. 312</i>                             | <i>See pg. 315</i>  | <i>See pg. 317</i>  |
|--------------------------------|-----------------------|--------------------|--------------------|----------------------|--|--------------------------------|--|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS          | VALVE STEM SEALS   | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS                              | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER                     | GOLD RACE   |
| 36308-1 <sup>c</sup>           | 96803-16 <sup>c</sup> | 99946-16           |                    | 99097-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup> | 44975-1 <sup>g</sup>           | 36801-16 <sup>h</sup><br>36800-16 <sup>i</sup> | 36774-16 <sup>j</sup><br>11746-16 <sup>k</sup><br>44746-16 <sup>l</sup> | 36750-16 <sup>m</sup><br>36759-16 <sup>n</sup><br>36758-16 <sup>o</sup> |
| 36308-1 <sup>c</sup>           | 96803-16 <sup>c</sup> | 99946-16           |                    | 99097-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup> | 44975-1 <sup>g</sup>           | 36801-16 <sup>h</sup><br>36800-16 <sup>i</sup> | 36774-16 <sup>j</sup><br>11746-16 <sup>k</sup><br>44746-16 <sup>l</sup> | 36750-16 <sup>m</sup><br>36759-16 <sup>n</sup><br>36758-16 <sup>o</sup> |
| 36308-1 <sup>c</sup>           | 96803-16 <sup>c</sup> | 99946-16           |                    | 99097-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup> | 44975-1 <sup>g</sup>           | 36801-16 <sup>h</sup><br>36800-16 <sup>i</sup> | 36774-16 <sup>j</sup><br>11746-16 <sup>k</sup><br>44746-16 <sup>l</sup> | 36750-16 <sup>m</sup><br>36759-16 <sup>n</sup><br>36758-16 <sup>o</sup> |
| 36308-1 <sup>c</sup>           | 96803-16 <sup>c</sup> | 99946-16           |                    | 99097-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup> | 44975-1 <sup>g</sup>           | 36801-16 <sup>h</sup><br>36800-16 <sup>i</sup> | 36774-16 <sup>j</sup><br>11746-16 <sup>k</sup><br>44746-16 <sup>l</sup> | 36750-16 <sup>m</sup><br>36759-16 <sup>n</sup><br>36758-16 <sup>o</sup> |
| 36308-1 <sup>c</sup>           | 96803-16 <sup>c</sup> | 99946-16           |                    | 99097-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup> | 44975-1 <sup>g</sup>           | 36801-16 <sup>h</sup><br>36800-16 <sup>i</sup> | 36774-16 <sup>j</sup><br>11746-16 <sup>k</sup><br>44746-16 <sup>l</sup> | 36750-16 <sup>m</sup><br>36759-16 <sup>n</sup><br>36758-16 <sup>o</sup> |
| 36308-1 <sup>c</sup>           | 96803-16 <sup>c</sup> | 99946-16           |                    | 99097-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup> | 44975-1 <sup>g</sup>           | 36801-16 <sup>h</sup><br>36800-16 <sup>i</sup> | 36774-16 <sup>j</sup><br>11746-16 <sup>k</sup><br>44746-16 <sup>l</sup> | 36750-16 <sup>m</sup><br>36759-16 <sup>n</sup><br>36758-16 <sup>o</sup> |

**Section Continued**

- a Cam and Lifter Kit, includes installation lubricants.
- b Cam and Lifter Kit, includes installation lubricants, and rocker arm adjusting nuts.
- c Contains standard diameter valve springs, no machining required.
- d Machined steel, heat treated.
- e Pro Series one-piece, for 351 engines, heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- f For 302 engines, heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- g For 73-93 engines, performance steel billet gears and roller chain set.
- h 1.6 ratio, cast, rail type for 3/8" studs for 69-76 engines, non-adjustable with 5/16" top bottleneck studs, adjustable if straight 3/8" studs and locking nuts are installed.
- i 1.6 ratio, cast, non-rail type for 3/8" studs, must machine cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- j Crane Classic extruded, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- k Energizer, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- l Energizer, 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- m 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- n 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- o 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.

## COMPLETE CAM SPECIFICATIONS

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code  | See pg. 293<br>LIFTERS                         | Degrees             | Advertised | Degrees            | Open/Close                     | Lash        | Gross        |
|---|----------------------------------|-----------------------|---|--|---------------------|------------|--------------------|--------------------------------|-------------|--------------|
|   |                                  |                       |   |  | Duration<br>@ .050" | Duration   | Lobe<br>Separation | @ .050"<br>Cam Lift<br>Int/Exh | Hot<br>Int. | Lift<br>Int. |
| <b>Hydraulic Lifter Camshafts</b>   |                                  |                       |   |  |                     |            |                    |                                |             |              |
| Good low end and mid range torque and HP, good idle, daily usage, off road, towing, economy, performance and fuel efficiency, 2600-3000 cruise RPM, marine application: primarily used in 351W cu.in. near-stock to mildly modified engines for mild performance applications in light boats, OK for through-prop exhaust, 8.75 to 10.0 compression ratio advised. Good w/centrifugal or small Roots supercharger, 8 lbs. maximum boost w/8.5 maximum compression ratio advised, good for plate nitrous system. | <b>Z-268-2</b>                   | 1800-<br>5600         | <b>443511*</b><br><b>443512<sup>a</sup></b> | <b>99280-16</b>                                | 218                 | 268        | 112                | 2 36                           | .000        | .490         |
|   |                                  |                       |   |  | 224                 | 274        | 49 (5)             | .000                           | .504        |              |
| Performance usage, bracket racing, Street, Heavy, auto trans w/3000+ converter, oval track: Street Stock, 4-bbl, 1/4-3/8 mile, serious off road, 9.0 to 10.5 compression ratio advised.   | <b>H-220/307-2-10</b>            | 2400-<br>5800         | <b>440131*</b>                              | <b>99280-16</b><br><b>99380-16<sup>b</sup></b> | 220                 | 280        | 110                | 5 35                           | .000        | .491         |
|   |                                  |                       |   |  | 230                 | 290        | 50 0               | .000                           | .509        |              |
| Performance usage, Street Stock, Enduro, Hobby, 2-bbl or 4-bbl, 1/4-3/8 mile, 9.0 to 10.5 compression ratio advised.  | <b>H-222/3114-10</b>             | 2600-<br>6000         | <b>440211*</b>                              | <b>99280-16</b><br><b>99380-16<sup>b</sup></b> | 222                 | 278        | 110                | 6 36                           | .000        | .498         |
|   |                                  |                       |   |  | 222                 | 278        | 46 (4)             | .000                           | .498        |              |
| Good mid range RPM torque and HP, fair idle, moderate performance usage, bracket racing, good w/aluminum cylinder heads, auto trans w/2000+ converter, 3000-3400 cruise RPM, 9.25 to 11.0 compression ratio advised. Good w/centrifugal or Roots supercharger, 10 lbs. Maximum boost w/8.5 maximum compression ratio advised, good w/plate or manifold nitrous system.  | <b>H-224/315-251-10</b>          | 2800-<br>6200         | <b>440221*</b>                              | <b>99280-16</b><br><b>99380-16<sup>b</sup></b> | 224                 | 274        | 110                | 7 37                           | .000        | .504         |
|   |                                  |                       |   |  | 230                 | 280        | 50 0               | .000                           | .518        |              |
| Performance usage, bracket racing, Street, Heavy, auto trans w/3000+ converter, oval track: Street Stock, Enduro, Hobby, 4-bbl, 1/4-3/8 mile, 9.5 to 11.0 compression ratio advised.  | <b>H-226/314-2-10</b>            | 2800-<br>6200         | <b>440141*</b>                              | <b>99280-16</b><br><b>99380-16<sup>b</sup></b> | 226                 | 286        | 110                | 8 38                           | .000        | .502         |
|   |                                  |                       |   |  | 236                 | 296        | 53 3               | .000                           | .520        |              |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On

engines equipped with bottleneck type studs, using **99768-16** positive locking nuts will permit valve adjustment. For engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (**99170-1**). Refer to page 324 for details.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (**36655-16**) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. See page 305 for ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our **44975-1** or **44984-1** timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreeding in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Left hand rotation hydraulic camshafts are available on special order. Contact Crane's Performance Consultants for details.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                                  | See pg. 312                                    | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|--|--|--|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS                              | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER                     | GOLD RACE   |
| 36308-1 <sup>c</sup>           | 96803-16 <sup>c</sup> | 99946-16                          |                       | 99097-1 <sup>f</sup>                         | 95644-16 <sup>h</sup><br>36622-16 <sup>i</sup> | 44975-1 <sup>j</sup>                         | 36801-16 <sup>l</sup><br>36800-16 <sup>m</sup> | 36774-16 <sup>n</sup><br>11746-16 <sup>o</sup><br>44746-16 <sup>p</sup> | 36750-16 <sup>q</sup><br>36759-16 <sup>r</sup><br>36758-16 <sup>s</sup> |
|                                | 96874-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99094-1 <sup>g</sup> | 95644-16 <sup>h</sup><br>36622-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> | 36801-16 <sup>l</sup><br>36800-16 <sup>m</sup> | 36774-16 <sup>n</sup><br>11746-16 <sup>o</sup><br>44746-16 <sup>p</sup> | 36750-16 <sup>q</sup><br>36759-16 <sup>r</sup><br>36758-16 <sup>s</sup> |
|                                | 96874-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99094-1 <sup>g</sup> | 95644-16 <sup>h</sup><br>36622-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> | 36801-16 <sup>l</sup><br>36800-16 <sup>m</sup> | 36774-16 <sup>n</sup><br>11746-16 <sup>o</sup><br>44746-16 <sup>p</sup> | 36750-16 <sup>q</sup><br>36759-16 <sup>r</sup><br>36758-16 <sup>s</sup> |
|                                | 96874-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99094-1 <sup>g</sup> | 95644-16 <sup>h</sup><br>36622-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> | 36801-16 <sup>l</sup><br>36800-16 <sup>m</sup> | 36774-16 <sup>n</sup><br>11746-16 <sup>o</sup><br>44746-16 <sup>p</sup> | 36750-16 <sup>q</sup><br>36759-16 <sup>r</sup><br>36758-16 <sup>s</sup> |
|                                | 96874-16 <sup>d</sup> | 99943-16<br>99969-16 <sup>e</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>f</sup><br>99094-1 <sup>g</sup> | 95644-16 <sup>h</sup><br>36622-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> | 36801-16 <sup>l</sup><br>36800-16 <sup>m</sup> | 36774-16 <sup>n</sup><br>11746-16 <sup>o</sup><br>44746-16 <sup>p</sup> | 36750-16 <sup>q</sup><br>36759-16 <sup>r</sup><br>36758-16 <sup>s</sup> |

Section Continued

- a Cam and Lifter Kit, includes installation lubricants, and rocker arm adjusting nuts.
- b Optional Hi Intensity hydraulic lifters, see page 292 for details.
- c Contains standard diameter valve springs, no machining required.
- d Must machine cylinder heads.
- e Requires Crane Multi Fit valve locks.
- f Machined steel, heat treated.
- g Machined steel, heat treated, Multi Fit.
- h Pro Series one-piece, for 351 engines, for use with or without pushrod guideplate cylinder heads.
- i For 302 engines, heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- j For 73-93 engines, performance steel billet gears and roller chain set.
- k For 73-93 engines, Pro Series steel billet gears and roller chain set.
- l 1.6 ratio, cast, rail type for 3/8" studs for 69-76 engines, non-adjustable with 5/16" top bottleneck studs, adjustable if straight 3/8" studs and locking nuts are installed.
- m 1.6 ratio, cast, non-rail type for 3/8" studs, must machine cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- n Crane Classic extruded, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- o Energizer, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- p Energizer, 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- q 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- r 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- s 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                           | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------------------------|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |                                   |  |   |                               |  |                     |                               |
| Good mid range to upper RPM torque and HP, fair idle, moderate performance usage, bracket racing, auto trans w/2500+ converter, 3200-3600 cruise RPM, 9.5 to 11.0 compression ratio advised. Good w/centrifugal or Roots supercharger, 10 lbs. Maximum boost w/8.5 maximum compression ratio advised, good w/plate or manifold nitrous system. | H-286-2                          | 2800-6600             | 444551*<br>444552 <sup>a</sup>             | 99280-16<br>99380-16 <sup>b</sup> | 226<br>236                                 | 286<br>296                                    | 112                           | 6 40<br>55 1                                 | .000<br>.000        | .502<br>.520                  |
| Performance usage, good mid-range to upper RPM torque and HP, Street Stock, Enduro, Hobby, 2-bbl or 4-bbl, 1/4-3/8 mile, serious off road, 9.0 to 10.5 compression ratio advised.  | H-228/3200-6                     | 2800-6400             | 440551*                                    | 99280-16<br>99380-16 <sup>b</sup> | 228<br>228                                 | 284<br>284                                    | 106                           | 12 36<br>44 4                                | .000<br>.000        | .512<br>.512                  |
| Performance usage, bracket racing, Street, Heavy, auto trans w/3000+ converter, oval track 1/4-3/8 mile: Street Stock, Enduro, Hobby, 4-bbl, 10.0 to 11.5 compression ratio advised.   | H-230/318-2-8                    | 3000-6600             | 440151*                                    | 99280-16<br>99380-16 <sup>b</sup> | 230<br>240                                 | 290<br>300                                    | 108                           | 12 38<br>53 7                                | .000<br>.000        | .509<br>.526                  |
| Performance usage, radical street, bracket racing, good mid range to upper RPM torque and HP, Street, Heavy, auto trans w/3000+ converter, oval track: good low to mid-range torque and HP, Street Stock, Enduro, Hobby, 2-bbl or 4-bbl, 1/4-3/8 mile, 10.0 to 11.5 compression ratio advised.   | H-234/3294-25-10                 | 3200-6800             | 440161*                                    | 99280-16<br>99380-16 <sup>b</sup> | 234<br>238                                 | 290<br>294                                    | 110                           | 12 42<br>54 4                                | .000<br>.000        | .527<br>.536                  |
| Performance usage, bracket racing, good upper RPM torque and HP, Street, Heavy, Pro ET, auto trans w/race converter, 10.5 to 11.5 compression ratio advised.   | H-236/325-25-10                  | 3400-7000             | 440171*                                    | 99280-16<br>99380-16 <sup>b</sup> | 236<br>240                                 | 296<br>300                                    | 110                           | 13 43<br>55 5                                | .000<br>.000        | .520<br>.526                  |
| Performance usage, bracket racing, good upper RPM HP, Street, Heavy, Pro ET, good w/manifold nitrous system, auto trans w/race converter, 10.5 to 11.5 compression ratio advised. Good with supercharger, 15 lbs. maximum boost w/8.0 maximum compression ratio advised.   | H-236/325-25-14                  | 3400-7200             | 440231*                                    | 99280-16<br>99380-16 <sup>b</sup> | 236<br>240                                 | 296<br>300                                    | 114                           | 9 47<br>59 1                                 | .000<br>.000        | .520<br>.526                  |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. For

engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (36655-16) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. See page 305 for ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Left hand rotation hydraulic camshafts are available on special order. Contact Crane's Performance Consultants for details.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                                  | See pg. 312                                    | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|--|--|--|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS                              | — ALUMINUM CRANE CLASSIC/ ENERGIZER                                     | ROCKERS — GOLD RACE   |
|                                | 96874-16 <sup>c</sup> | 99943-16<br>99969-16 <sup>d</sup> | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> | 36801-16 <sup>k</sup><br>36800-16 <sup>l</sup> | 36774-16 <sup>m</sup><br>11746-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36750-16 <sup>p</sup><br>36759-16 <sup>q</sup><br>36758-16 <sup>r</sup> |
|                                | 96874-16 <sup>c</sup> | 99943-16<br>99969-16 <sup>d</sup> | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> | 36801-16 <sup>k</sup><br>36800-16 <sup>l</sup> | 36774-16 <sup>m</sup><br>11746-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36750-16 <sup>p</sup><br>36759-16 <sup>q</sup><br>36758-16 <sup>r</sup> |
|                                | 96874-16 <sup>c</sup> | 99943-16<br>99969-16 <sup>d</sup> | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> | 36801-16 <sup>k</sup><br>36800-16 <sup>l</sup> | 36774-16 <sup>m</sup><br>11746-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36750-16 <sup>p</sup><br>36759-16 <sup>q</sup><br>36758-16 <sup>r</sup> |
|                                | 96874-16 <sup>c</sup> | 99943-16<br>99969-16 <sup>d</sup> | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> | 36801-16 <sup>k</sup><br>36800-16 <sup>l</sup> | 36774-16 <sup>m</sup><br>11746-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36750-16 <sup>p</sup><br>36759-16 <sup>q</sup><br>36758-16 <sup>r</sup> |
|                                | 96874-16 <sup>c</sup> | 99943-16<br>99969-16 <sup>d</sup> | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup> | 44975-1 <sup>i</sup><br>44984-1 <sup>j</sup> | 36801-16 <sup>k</sup><br>36800-16 <sup>l</sup> | 36774-16 <sup>m</sup><br>11746-16 <sup>n</sup><br>44746-16 <sup>o</sup> | 36750-16 <sup>p</sup><br>36759-16 <sup>q</sup><br>36758-16 <sup>r</sup> |

**Section Continued**

- a Cam and Lifter Kit, includes installation lubricants, and rocker arm adjusting nuts.
- b Optional Hi Intensity hydraulic lifters, see page 292 for details.
- c Must machine cylinder heads.
- d Requires Crane Multi Fit valve locks.
- e Machined steel, heat treated.
- f Machined steel, heat treated, Multi Fit.
- g Pro Series one piece, for 351 engines, for use with or without pushrod guideplate cylinder heads.
- h For 302 engines, heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- i For 73-93 engines, performance steel billet gears and roller chain set.
- j For 73-93 engines, Pro Series steel billet gears and roller chain set.
- k 1.6 ratio, cast, rail type for 3/8" studs for 69-76 engines, non-adjustable with 5/16" top bottleneck studs, adjustable if straight 3/8" studs and locking nuts are installed.
- l 1.6 ratio, cast, non-rail type for 3/8" studs, must machine cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- m Crane Classic extruded, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- n Energizer, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- o Energizer, 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- p 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- q 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- r 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |                 |  |   |                               |  |                     |                               |
| Rough idle, performance usage, radical street, good upper RPM HP, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 112.0 compression ratio advised. Good w/Roots supercharger, 15 lbs. maximum boost w/8.0 maximum compression ratio advised, good w/manifold nitrous system. | <b>H-238/3347-2-10</b>           | 3400-7200             | <b>440661*</b>                             | <b>99280-16</b> | 238  | 294   | 110                           | 14 44  | .000                | .536                          |
|  |                                  |                       |  |                 | <b>99380-16<sup>a</sup></b>                | 248   | 304                           | 59 9   | .000                | .560                          |
| Moderate competition, bracket racing, Heavy, Pro ET, Super ET, auto trans w/race converter, 11.0 to 12.0 compression ratio advised.  | <b>H-242/310-6</b>               | 3400-7000             | <b>440241*</b>                             | <b>99280-16</b> | 242  | 300   | 106                           | 19 43  | .000                | .496                          |
|  |                                  |                       |  |                 | <b>99380-16<sup>a</sup></b>                | 242   | 300                           | 51 11  | .000                | .496                          |
| Moderate competition, bracket racing, Heavy, Pro ET, Super ET, auto trans w/race converter, 11.0 to 12.5 compression ratio advised.  | <b>H-246/3334-6</b>              | 3600-7200             | <b>440181*</b>                             | <b>99280-16</b> | 246  | 306   | 106                           | 21 45  | .000                | .533                          |
|  |                                  |                       |  |                 | <b>99380-16<sup>a</sup></b>                | 246   | 306                           | 53 13  | .000                | .533                          |
| Moderate competition, good upper RPM HP, bracket racing, auto trans w/race converter, 11.5 to 13.0 compression ratio advised.  | <b>H-246/336-25-8</b>            | 3800-7200             | <b>440191*</b>                             | <b>99280-16</b> | 246  | 306   | 108                           | 20 46  | .000                | .538                          |
|  |                                  |                       |  |                 | <b>99380-16<sup>a</sup></b>                | 254   | 314                           | 60 14  | .000                | .550                          |
| Competition only, good upper RPM HP, bracket racing w/ light car, flat tappet restricted classes, auto trans w/race converter, 12.5 minimum compression ratio advised.   | <b>H-260/360-25-8</b>            | 4200-7200             | <b>440201*</b>                             | <b>99280-16</b> | 260  | 330   | 108                           | 27 53  | .000                | .576                          |
|  |                                  |                       |  |                 | <b>99380-16<sup>a</sup></b>                | 268   | 338                           | 67 21  | .000                | .595                          |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using **99768-16** positive locking nuts will permit valve adjustment. For

engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (**99170-1**). Refer to page 324 for details.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (**36655-16**) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. See page 305 for ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our **44975-1** or **44984-1** timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Left hand rotation hydraulic camshafts are available on special order. Contact Crane's Performance Consultants for details.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                                  | See pg. 312                                    | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|--|--|--|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS                              | — ALUMINUM CRANE CLASSIC/ ENERGIZER                                     | ROCKERS — GOLD RACE   |
|                                | 96874-16 <sup>b</sup> | 99943-16<br>99969-16 <sup>c</sup> | 99820-16 <sup>b</sup> | 99097-1 <sup>d</sup><br>99094-1 <sup>e</sup> | 95644-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> | 36801-16 <sup>j</sup><br>36800-16 <sup>k</sup> | 36774-16 <sup>l</sup><br>11746-16 <sup>m</sup><br>44746-16 <sup>n</sup> | 36750-16 <sup>o</sup><br>36759-16 <sup>p</sup><br>36758-16 <sup>q</sup> |
|                                | 96874-16 <sup>b</sup> | 99943-16<br>99969-16 <sup>c</sup> | 99820-16 <sup>b</sup> | 99097-1 <sup>d</sup><br>99094-1 <sup>e</sup> | 95644-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> | 36801-16 <sup>j</sup><br>36800-16 <sup>k</sup> | 36774-16 <sup>l</sup><br>11746-16 <sup>m</sup><br>44746-16 <sup>n</sup> | 36750-16 <sup>o</sup><br>36759-16 <sup>p</sup><br>36758-16 <sup>q</sup> |
|                                | 96874-16 <sup>b</sup> | 99943-16<br>99969-16 <sup>c</sup> | 99820-16 <sup>b</sup> | 99097-1 <sup>d</sup><br>99094-1 <sup>e</sup> | 95644-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> | 36801-16 <sup>j</sup><br>36800-16 <sup>k</sup> | 36774-16 <sup>l</sup><br>11746-16 <sup>m</sup><br>44746-16 <sup>n</sup> | 36750-16 <sup>o</sup><br>36759-16 <sup>p</sup><br>36758-16 <sup>q</sup> |
|                                | 96874-16 <sup>b</sup> | 99943-16<br>99969-16 <sup>c</sup> | 99820-16 <sup>b</sup> | 99097-1 <sup>d</sup><br>99094-1 <sup>e</sup> | 95644-16 <sup>f</sup><br>36622-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> | 36801-16 <sup>j</sup><br>36800-16 <sup>k</sup> | 36774-16 <sup>l</sup><br>11746-16 <sup>m</sup><br>44746-16 <sup>n</sup> | 36750-16 <sup>o</sup><br>36759-16 <sup>p</sup><br>36758-16 <sup>q</sup> |

- a Optional Hi Intensity hydraulic lifters, see page 292 for details.
- b Must machine cylinder heads.
- c Requires Crane Multi Fit valve locks.
- d Machined steel, heat treated.
- e Machined steel, heat treated, Multi Fit.
- f Pro Series one-piece, for 351 engines, heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- g For 302 engines, heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- h For 73-93 engines, performance steel billet gears and roller chain set.
- i For 73-93 engines, Pro Series steel billet gears and roller chain set.
- j 1.6 ratio, cast, rail type for 3/8" studs for 69-76 engines, non-adjustable with 5/16" top bottleneck studs, adjustable if straight 3/8" studs and locking nuts are installed.
- k 1.6 ratio, cast, non-rail type for 3/8" studs, must machine cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- l Crane Classic extruded, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- m Energizer, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- n Energizer, 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- o 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- p 1.6 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- q 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |                                  |                       |  |                       |  |   |                               |  |                     |                               |
| Excellent low end torque and HP, smooth idle, daily usage, towing, economy, also mild turbocharged, 2200-3000 cruise RPM, 8.0 to 9.5 compression ratio advised.   | 2020                             | 800-<br>4800          | 444211 <sup>a,b</sup>                      | 36530-16 <sup>d</sup> | 208  | 262   | 112                           | (3) 31                                       | .000                | .530                          |
|   |                                  |                       | 444212 <sup>a,b,c</sup>                    | 36532-16 <sup>e</sup> | 216  | 270   | 45 (9)                        | .000   | .530                |                               |
| Good low end torque and HP, good idle, daily usage, performance and fuel efficiency, off road, towing, 2400-3000 cruise RPM, 8.75 to 10.0 compression ratio advised.  | HR-216/325-2S-12                 | 1400-<br>5400         | 449541 <sup>a,b</sup>                      | 36530-16 <sup>d</sup> | 216  | 278   | 112                           | 1 35   | .000                | .520                          |
|   |                                  |                       |  | 36532-16 <sup>e</sup> | 224  | 286   | 49 (5)                        | .000   | .542                |                               |
| Good low end and mid range torque and HP, good idle, moderate performance usage, 2600-3200 cruise RPM, good w/plate nitrous system, 9.0 to 10.5 compression ratio advised. Also good w/supercharger, 20 lbs. maximum boost w/ 8.5 maximum compression ratio advised.  | HR-220/332-2S2-14                | 1600-<br>5600         | 449631 <sup>a,b</sup>                      | 36530-16 <sup>d</sup> | 220  | 282   | 114                           | 1 39   | .000                | .531                          |
|   |                                  |                       |  | 36532-16 <sup>e</sup> | 228  | 290   | 53 (5)                        | .000   | .552                |                               |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2000+ converter, serious off road, 2800-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.   | HR-224/339-2S-12                 | 1800-<br>5800         | 449601 <sup>a,b</sup>                      | 36530-16 <sup>d</sup> | 224  | 286   | 112                           | 5 39   | .000                | .542                          |
|   |                                  |                       |  | 36532-16 <sup>e</sup> | 232  | 294   | 53 (1)                        | .000   | .563                |                               |
| Good mid range torque and HP, fair idle, performance usage, bracket racing, auto trans with 2500+ converter, 3000-3600 cruise RPM, 10.0 to 11.5 compression ratio advised. Also good w/centrifugal or Roots supercharger, 24 lbs. maximum boost with 8.5 maximum compression ratio advised, also good with manifold nitrous system. | HR-228/345-2S1-14                | 2400-<br>6400         | 449681 <sup>a,b</sup>                      | 36530-16 <sup>d</sup> | 228  | 290   | 114                           | 5 43   | .000                | .552                          |
|   |                                  |                       |  | 36532-16 <sup>e</sup> | 232  | 294   | 55 (3)                        | .000   | .563                |                               |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Cylinder head removal will be required in 82-84 302 H.O. applications in order to install the 36532-16 or 36560-16 hydraulic roller tappets.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. For engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (36655-16) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. See page 305 for ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                                  | See pg. 312                                    | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|--|--|--|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS                              | — ALUMINUM CRANE CLASSIC/ ENERGIZER                                     | ROCKERS — GOLD RACE   |
| 44308-1 <sup>f</sup>           | 96870-16 <sup>g</sup> | 99943-16<br>99969-16 <sup>h</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>j</sup> | 95636-16 <sup>k</sup><br>95640-16 <sup>l</sup> | 44975-1 <sup>m</sup><br>44984-1 <sup>n</sup> | 36801-16 <sup>o</sup><br>36800-16 <sup>p</sup> | 36774-16 <sup>q</sup><br>11746-16 <sup>r</sup><br>44746-16 <sup>s</sup> | 36750-16 <sup>t</sup><br>36759-16 <sup>u</sup><br>36758-16 <sup>v</sup> |
| 44308-1 <sup>f</sup>           | 96870-16 <sup>g</sup> | 99943-16<br>99969-16 <sup>h</sup> | 99820-16 <sup>h</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>j</sup> | 95636-16 <sup>k</sup><br>95640-16 <sup>l</sup> | 44975-1 <sup>m</sup><br>44984-1 <sup>n</sup> | 36801-16 <sup>o</sup><br>36800-16 <sup>p</sup> | 36774-16 <sup>q</sup><br>11746-16 <sup>r</sup><br>44746-16 <sup>s</sup> | 36750-16 <sup>t</sup><br>36759-16 <sup>u</sup><br>36758-16 <sup>v</sup> |
|                                | 96870-16 <sup>g</sup> | 99943-16<br>99969-16 <sup>h</sup> | 99820-16 <sup>h</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>j</sup> | 95636-16 <sup>k</sup><br>95640-16 <sup>l</sup> | 44975-1 <sup>m</sup><br>44984-1 <sup>n</sup> | 36801-16 <sup>o</sup><br>36800-16 <sup>p</sup> | 36774-16 <sup>q</sup><br>11746-16 <sup>r</sup><br>44746-16 <sup>s</sup> | 36750-16 <sup>t</sup><br>36759-16 <sup>u</sup><br>36758-16 <sup>v</sup> |
|                                | 96870-16 <sup>g</sup> | 99943-16<br>99969-16 <sup>h</sup> | 99820-16 <sup>h</sup> | 99097-1 <sup>i</sup><br>99087-1 <sup>j</sup> | 95636-16 <sup>k</sup><br>95640-16 <sup>l</sup> | 44975-1 <sup>m</sup><br>44984-1 <sup>n</sup> | 36801-16 <sup>o</sup><br>36800-16 <sup>p</sup> | 36774-16 <sup>q</sup><br>11746-16 <sup>r</sup><br>44746-16 <sup>s</sup> | 36750-16 <sup>t</sup><br>36759-16 <sup>u</sup><br>36758-16 <sup>v</sup> |

Section Continued

- a Camshaft has standard base circle diameter, for use with **36532-16** or **36560-16** hydraulic roller lifters. Also applicable to 94-97 351W engines.
- b Requires **36970-1** (.467" I.D.) or **44970-1** (.531" I.D.) steel, or **36990-1** (.467" I.D.) or **44990-1** (.531" I.D.) aluminum-bronze distributor drive gear.
- c Cam and spring kit, includes **44308-1** kit, containing valve springs, valve spring retainers, and valve stem locks.
- d For use with standard Ford alignment bars, on engines originally equipped with hydraulic roller lifters.
- e Vertical locking bar hydraulic roller lifters, no machining required. Cylinder head removal required in 82-84 302 H.O. applications. Appropriate pushrods required.
- f Optional spring, retainer, and lock kit for 79-93 engines, no machining required.
- g Must machine cylinder heads.
- h Requires Crane Multi Fit valve locks.
- i Machined steel, heat treated.
- j Machined steel, heat treated, Multi Fit.
- k Pro Series one-piece, for 351W engines with non-adjustable pedestal mount rocker arms.
- l Pro Series one-piece, for 351W engines with adjustable rocker arms with Pushrod Guideplate Conversion Kit (**36655-16**). See page 325 for details.
- m For 73-93 engines, performance steel billet gears and roller chain set.
- n For 73-93 engines, Pro Series steel billet gears and roller chain set.
- o 1.6 ratio, cast, rail type for 3/8" studs. Non-adjustable with 5/16" top bottleneck studs, adjustable with straight 3/8" studs and locking nuts.
- p 1.6 ratio, cast, non-rail type for 3/8" studs, must machine cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- q Crane Classic extruded, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- r Energiizer, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- s Energiizer, 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- t 1.6 ratio, 3/8" stud, must machine cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- u 1.6 ratio, non-adjustable, for 77-93 pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- v 1.7 ratio, non-adjustable, for 77-93 pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.

## COMPLETE CAM SPECIFICATIONS

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | See pg. 294<br>LIFTERS                         | Degrees             | Advertised          | Degrees            | Open/Close          | Lash        | Gross        |
|---|----------------------------------|-----------------------|--|--|---------------------|---------------------|--------------------|---------------------|-------------|--------------|
|   |                                  |                       |  |  | Duration<br>@ .050" | Degrees<br>Duration | Lobe<br>Separation | @ .050"<br>Cam Lift | Hot<br>Int. | Lift<br>Int. |
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |                                  |                       |  |  |                     |                     |                    |                     |             |              |
| Good mid range torque and HP, fair idle, performance usage, supercharged, nitrous, bracket racing, auto trans w/3000+ converter, 3400-3800 cruise RPM, 10.0 to 11.5 compression ratio advised.  | HR-232/352-2S1-12                | 2600-<br>6600         | 449561 <sup>a,b</sup>                      | 36530-16 <sup>c</sup><br>36532-16 <sup>d</sup> | 232                 | 294                 | 112                | 9 43                | .000        | .563         |
|   |                                  |                       |  |  | 240                 | 302                 |                    | 57 3                | .000        | .584         |
| Good mid to upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3000+ converter, 3600-4000 cruise RPM, 10.5 to 12.0 compression ratio advised.   | HR-236/359-2S-10                 | 2800-<br>6800         | 449641 <sup>a,b</sup>                      | 36530-16 <sup>c</sup><br>36532-16 <sup>d</sup> | 236                 | 298                 | 110                | 13 43               | .000        | .574         |
|   |                                  |                       |  |  | 244                 | 306                 |                    | 57 7                | .000        | .595         |
| Moderate performance usage, rough idle, bracket racing, auto trans w/3500+ converter, good w/manifold nitrous system, 3600-4000 cruise RPM, 10.5 to 12.0 compression ratio advised. Also good w/centrifugal or Roots supercharger, 28 lbs. maximum boost w/8.5 maximum compression ratio. | HR-240/365-2S1-14                | 3000-<br>7000         | 449711 <sup>a,b</sup>                      | 36530-16 <sup>c</sup><br>36532-16 <sup>d</sup> | 240                 | 302                 | 114                | 11 49               | .000        | .584         |
|   |                                  |                       |  |  | 244                 | 306                 |                    | 61 3                | .000        | .595         |
| Moderate performance usage, rough idle, performance usage, supercharged, nitrous, for 400+ cu.in., bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 11.5 minimum compression ratio advised.  | HR-244/372-2S-12                 | 3200-<br>7000         | 449571 <sup>a,b</sup>                      | 36530-16 <sup>c</sup><br>36532-16 <sup>d</sup> | 244                 | 306                 | 112                | 15 49               | .000        | .595         |
|   |                                  |                       |  |  | 256                 | 318                 |                    | 65 11               | .000        | .595         |
| Performance usage, for 400+ cu.in., bracket racing, good w/large plate nitrous, auto trans w/4000+ converter, 12.5 minimum compression ratio advised. Also good w/centrifugal or Roots supercharger, 34 lbs. maximum boost w/8.5 maximum compression ratio.                               | HR-252/400-2S-14                 | 3600-<br>7200         | 449741 <sup>a,b</sup>                      | 36532-16 <sup>d</sup>                          | 252                 | 322                 | 114                | 15.5 56.5           | .000        | .640         |
|   |                                  |                       |  |  | 260                 | 330                 |                    | 68 12               | .000        | .640         |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Cylinder head removal will be required in 82-84 302 H.O. applications in order to install the 36532-16 or 36560-16 hydraulic roller tappets.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O., and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. For engines equipped with pedestal mounted rocker arms and hydraulic lifters, excessive lifter preload can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (36655-16) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. See page 305 for ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                                  | See pg. 312                                    | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|--|--|--|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS                              | — ALUMINUM CRANE CLASSIC/ ENERGIZER                                     | ROCKERS — GOLD RACE   |
|                                | 96870-16 <sup>e</sup> | 99943-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>g</sup><br>99087-1 <sup>h</sup> | 95636-16 <sup>i</sup><br>95640-16 <sup>j</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> | 36801-16 <sup>m</sup><br>36800-16 <sup>n</sup> | 36774-16 <sup>o</sup><br>11746-16 <sup>p</sup><br>44746-16 <sup>q</sup> | 36750-16 <sup>r</sup><br>36759-16 <sup>s</sup><br>36758-16 <sup>t</sup> |
|                                | 96870-16 <sup>e</sup> | 99943-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>g</sup><br>99087-1 <sup>h</sup> | 95636-16 <sup>i</sup><br>95640-16 <sup>j</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> | 36801-16 <sup>m</sup><br>36800-16 <sup>n</sup> | 36774-16 <sup>o</sup><br>11746-16 <sup>p</sup><br>44746-16 <sup>q</sup> | 36750-16 <sup>r</sup><br>36759-16 <sup>s</sup><br>36758-16 <sup>t</sup> |
|                                | 96870-16 <sup>e</sup> | 99943-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>g</sup><br>99087-1 <sup>h</sup> | 95636-16 <sup>i</sup><br>95640-16 <sup>j</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> | 36801-16 <sup>m</sup><br>36800-16 <sup>n</sup> | 36774-16 <sup>o</sup><br>11746-16 <sup>p</sup><br>44746-16 <sup>q</sup> | 36750-16 <sup>r</sup><br>36759-16 <sup>s</sup><br>36758-16 <sup>t</sup> |
|                                | 96870-16 <sup>e</sup> | 99943-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>g</sup><br>99087-1 <sup>h</sup> | 95636-16 <sup>i</sup><br>95640-16 <sup>j</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> | 36801-16 <sup>m</sup><br>36800-16 <sup>n</sup> | 36774-16 <sup>o</sup><br>11746-16 <sup>p</sup><br>44746-16 <sup>q</sup> | 36750-16 <sup>r</sup><br>36759-16 <sup>s</sup><br>36758-16 <sup>t</sup> |
|                                | 96870-16 <sup>e</sup> | 99943-16<br>99969-16 <sup>f</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>g</sup><br>99087-1 <sup>h</sup> | 95636-16 <sup>i</sup><br>95640-16 <sup>j</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> | 36801-16 <sup>m</sup><br>36800-16 <sup>n</sup> | 36774-16 <sup>o</sup><br>11746-16 <sup>p</sup><br>44746-16 <sup>q</sup> | 36750-16 <sup>r</sup><br>36759-16 <sup>s</sup><br>36758-16 <sup>t</sup> |

- a Camshaft has standard base circle diameter, for use with **36532-16** or **36560-16** hydraulic roller lifters. Also applicable to 94-97 351W engines.
- b Requires **36970-1** (.467" I.D.) or **44970-1** (.531" I.D.) steel, or **36990-1** (.467" I.D.) or **44990-1** (.531" I.D.) aluminum-bronze distributor drive gear.
- c For use with standard Ford alignment bars, on engines originally equipped with hydraulic roller lifters.
- d Vertical locking bar hydraulic roller lifters, no machining required. Cylinder head removal required in 82-84 302 H.O. applications. Appropriate pushrods required.
- e Must machine cylinder heads.
- f Requires Crane Multi Fit valve locks.
- g Machined steel, heat treated.
- h Machined steel, heat treated, Multi Fit.
- i For 351W engines with non-adjustable pedestal mount rocker arms.
- j Pro Series one-piece, for 351W engines with adjustable rocker arms with Pushrod Guideplate Conversion Kit (**36655-16**). See page 325 for details.
- k For 73-93 engines, performance steel billet gears and roller chain set.
- l For 73-93 engines, Pro Series steel billet gears and roller chain set.
- m 1.6 ratio, cast, rail type for 3/8" studs. Non-adjustable with 5/16" top bottleneck studs, adjustable with straight 3/8" studs and locking nuts.
- n 1.6 ratio, cast, non-rail type for 3/8" studs, must machine cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- o Crane Classic extruded, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- p Energiizer, 1.6 ratio 3/8" stud, must machine 1966-00 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 1977-00 pedestal mount cylinder heads for street applications.
- q Energiizer, 1.7 ratio, non-adjustable, for pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- r 1.6 ratio, 3/8" stud, must machine cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- s 1.6 ratio, non-adjustable, for 77-93 pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.
- t 1.7 ratio, non-adjustable, for 77-93 pedestal mount cylinder heads, no machining required, includes Rocker Arm Pedestal Shim Kit.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|----------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| Good mid range torque & HP, performance usage, bracket racing, Street, Heavy, auto trans w/3000+ converter, oval track Sportsman, etc., 2-bbl or 4-bbl, 1/4-3/8 mile, serious off road, 10.5 to 11.5 compression ratio advised.  | F-238/3200-8                     | 2800-6600             | 441161*                                    | 99257-16 | 238  | 300   | 108                           | 16 42  | .022                        | .512                          |
|  |                                  |                       |  |          | 238  | 300   | 52 6                          | .022   | .512                        |                               |
| Performance usage, bracket racing, good mid-range torque, Heavy, Pro ET, auto trans w/race converter, oval track Sportsman, IMCA, etc., 2-bbl or 4-bbl, 1/4-3/8 mile, 11.0 to 12.5 compression ratio advised.  | F-246/3467-2S2-6                 | 3200-6800             | 440881*                                    | 99257-16 | 246  | 278   | 106                           | 20 46  | .012                        | .555                          |
|  |                                  |                       |  |          | 250  | 282   | 54 16                         | .012   | .565                        |                               |
| Performance usage, bracket racing, good mid-range torque and HP, Heavy, Pro ET, auto trans w/race converter, oval track Late Model, Sportsman, IMCA, etc., 4-bbl, 1/4-3/8 mile, serious off road, 11.0 to 12.5 compression ratio advised.  | F-248/3334-2-8                   | 3400-7200             | 441231*                                    | 99257-16 | 248  | 310   | 108                           | 21 47  | .022                        | .533                          |
|  |                                  |                       |  |          | 258  | 320   | 62 16                         | .022   | .555                        |                               |
| Rough idle, performance usage, radical street, good upper RPM HP, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 112.0 compression ratio advised. Good w/Roots supercharger, 15 lbs. maximum boost w/8.0 maximum compression ratio advised, good w/manifold nitrous system. | F-252/3574-2S1-10                | 3800-7400             | 440991*                                    | 99257-16 | 252  | 288   | 110                           | 20 52  | .026                        | .572                          |
|  |                                  |                       |  |          | 256  | 292   | 62 14                         | .026   | .581                        |                               |
| Performance usage, bracket racing, good mid-range HP, Pro, Pro ET, Super ET, auto trans w/race converter, oval track Late Model, etc., 4-bbl, 3/8-1/2 mile, 11.5 minimum compression ratio advised.  | F-252/3574-2S-6                  | 3800-7200             | 440981*                                    | 99257-16 | 252  | 288   | 106                           | 22 50  | .026                        | .572                          |
|  |                                  |                       |  |          | 260  | 296   | 58 22                         | .026   | .591                        |                               |
| Performance usage, bracket racing, good mid-range HP, Pro, Pro ET, Super Pro, auto trans w/race converter, oval track: Late Model, etc., 4-bbl, 3/8-1/2 mile, 11.5 minimum compression ratio advised.  | F-256/3634-2S-6                  | 4000-7400             | 441301*                                    | 99257-16 | 256  | 292   | 106                           | 25 51  | .026                        | .581                          |
|  |                                  |                       |  |          | 264  | 300   | 61 23                         | .026   | .601                        |                               |
| Performance usage, bracket racing, good mid to upper RPM HP, Pro, Super Pro, etc., auto trans w/race converter, oval track Late Model, etc., 2-bbl or 4-bbl, 3/8-1/2 mile, 11.5 minimum compression ratio advised.   | F-260/3694-2S7-6                 | 4200-7600             | 441431*                                    | 99257-16 | 260  | 296   | 106                           | 27 53  | .026                        | .591                          |
|  |                                  |                       |  |          | 264  | 300   | 61 23                         | .026   | .601                        |                               |
| Competition only, bracket racing, good upper RPM HP, Pro, Super Pro, auto trans w/race converter, high RPM long oval track, 12.0 minimum compression ratio advised.  | F-268/394-2S5-8                  | 4600-8000             | 441551*                                    | 99257-16 | 268  | 304   | 108                           | 29 59  | .018                        | .630                          |
|  |                                  |                       |  |          | 272  | 308   | 67 25                         | .018   | .640                        |                               |
| Competition only, good mid and upper RPM torque and HP, flat tappet restricted classes, bracket racing, auto trans w/race converter, 1/2 - 5/8 mile oval track, good with aftermarket cylinder heads, 12.0 minimum compression ratio advised.  | F-272/400-2S-6                   | 4800-8200             | 441591*                                    | 99257-16 | 272  | 308   | 106                           | 32 60  | .018                        | .640                          |
|  |                                  |                       |  |          | 276  | 312   | 66 30                         | .018   | .650                        |                               |
| Radical competition only, good upper RPM torque and HP, flat tappet restricted classes, bracket racing, good with aftermarket cylinder heads, auto trans w/race converter, 12.5 minimum compression ratio advised.   | F-276/406-2S1-8                  | 5000-8400             | 441621*                                    | 99257-16 | 276  | 312   | 108                           | 34 62  | .018                        | .650                          |
|  |                                  |                       |  |          | 284  | 320   | 74 30                         | .018   | .660                        |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O. engines, and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** Ford 221 thru 302 camshafts can be used in 351 Windsor engines if the engine is changed to 221 thru 302 firing order (1-5-4-2-6-3-7-8). Ford 351W firing order is 1-3-7-2-6-5-4-8.

**NOTE:** In order to effect valve adjustment when using mechanical lifter camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped). On engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment.

**NOTE:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (36655-16) for street applications, enabling the 1977-00 302 cu.in. and 351W engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. Refer to page 325 for details.

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreeding in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Left hand rotation mechanical camshafts are available on special order. Contact Crane's Performance Consultants for details.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328                                  | See pg. 312       | See pg. 315                        | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|---|--|-------------------|------------------------------------|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ENERGIZER | ROCKERS — GOLD RACE   |
|                                | 96877-16 <sup>a</sup> | 99943-16<br>99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99097-1 <sup>c</sup><br>99087-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup><br>95618-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> |                   | 36774-16 <sup>j</sup>              | 36750-16 <sup>k</sup><br>86757-16 <sup>l</sup><br>36757-16 <sup>m</sup> |
|                                | 96877-16 <sup>a</sup> | 99943-16<br>99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99097-1 <sup>c</sup><br>99087-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup><br>95618-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> |                   | 36774-16 <sup>j</sup>              | 36750-16 <sup>k</sup><br>86757-16 <sup>l</sup><br>36757-16 <sup>m</sup> |
|                                | 96877-16 <sup>a</sup> | 99943-16<br>99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99097-1 <sup>c</sup><br>99087-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup><br>95618-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> |                   | 36774-16 <sup>j</sup>              | 36750-16 <sup>k</sup><br>86757-16 <sup>l</sup><br>36757-16 <sup>m</sup> |
|                                | 96877-16 <sup>a</sup> | 99943-16<br>99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99097-1 <sup>c</sup><br>99087-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup><br>95618-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> |                   | 36774-16 <sup>j</sup>              | 36750-16 <sup>k</sup><br>86757-16 <sup>l</sup><br>36757-16 <sup>m</sup> |
|                                | 96877-16 <sup>a</sup> | 99943-16<br>99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99097-1 <sup>c</sup><br>99087-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup><br>95618-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> |                   | 36774-16 <sup>j</sup>              | 36750-16 <sup>k</sup><br>86757-16 <sup>l</sup><br>36757-16 <sup>m</sup> |
|                                | 96877-16 <sup>a</sup> | 99943-16<br>99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99097-1 <sup>c</sup><br>99087-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup><br>95618-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> |                   | 36774-16 <sup>j</sup>              | 36750-16 <sup>k</sup><br>86757-16 <sup>l</sup><br>36757-16 <sup>m</sup> |
|                                | 96877-16 <sup>a</sup> | 99956-16<br>99973-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99097-1 <sup>c</sup><br>99087-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup><br>95618-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> |                   | 36774-16 <sup>j</sup>              | 36750-16 <sup>k</sup><br>86757-16 <sup>l</sup><br>36757-16 <sup>m</sup> |
|                                | 96877-16 <sup>a</sup> | 99956-16<br>99973-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99097-1 <sup>c</sup><br>99087-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup><br>95618-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> |                   | 36774-16 <sup>j</sup>              | 36750-16 <sup>k</sup><br>86757-16 <sup>l</sup><br>36757-16 <sup>m</sup> |
|                                | 96877-16 <sup>a</sup> | 99956-16<br>99973-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99097-1 <sup>c</sup><br>99087-1 <sup>d</sup> | 95644-16 <sup>e</sup><br>36622-16 <sup>f</sup><br>95618-16 <sup>g</sup> | 44975-1 <sup>h</sup><br>44984-1 <sup>i</sup> |                   | 36774-16 <sup>j</sup>              | 36750-16 <sup>k</sup><br>86757-16 <sup>l</sup><br>36757-16 <sup>m</sup> |

- a** Must machine cylinder heads.
- b** Requires Crane Multi Fit valve locks.
- c** Machined steel, heat treated.
- d** Machined steel, heat treated, Multi Fit.
- e** Pro Series one-piece, for 351 engines, for use with or without pushrod guideplate cylinder heads.
- f** For 302 engines, heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- g** Pro Series one-piece, for 302 engines, for use with or without pushrod guideplate cylinder heads.
- h** For 73-93 engines, performance steel billet gears and roller chain set.
- i** For 73-93 engines, Pro Series steel billet gears and roller chain set.
- j** Crane Classic extruded, 1.6 ratio, 3/8" stud, must machine 66-93 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- k** 1.6 ratio, 3/8" stud, must machine 66-93 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- l** 1.6 ratio, 7/16" stud, must machine 66-93 cylinder heads and install **99157-16** rocker arm studs and **36650-1** pushrod guideplates.
- m** 1.7 ratio, 7/16" stud, must machine 66-93 cylinder heads and install **99157-16** rocker arm studs and **36650-1** pushrod guideplates.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b>   |                                  |                       |  |  |  |   |                               |  |                             |                               |
| Excellent low end and mid range torque and HP, good idle, daily performance usage, mild bracket racing, auto trans w/2500+ converter, 3000-3400 cruise RPM, 9.5 to 11.0 compression ratio advised.   | <b>SR-230/338-2S-10</b>          | 2400-6400             | <b>448501<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 230<br>238                                 | 280<br>288                                    | 110                           | 10 40<br>54 4                                | .020<br>.020                | .541<br>.650                  |
| Rough idle, performance usage, good low to mid-range torque & HP, bracket racing, auto trans w/3000+ converter, good w/manifold nitrous system, 10.5 to 12.0 compression ratio advised. Good w/Roots supercharger, 16 lbs. maximum boost w/8.0 maximum compression ratio advised.                          | <b>TR-244/3867-2S-10</b>         | 3200-7000             | <b>448031<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 244<br>252                                 | 284<br>292                                    | 110                           | 15 49<br>59 13                               | .022<br>.022                | .619<br>.640                  |
| Fair idle, moderate performance usage, good mid-range torque and HP, bracket racing, auto trans w/3500+ converter, good w/manifold nitrous system, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised. Good w/Roots supercharger, 16 lbs. maximum boost w/8.0 maximum compression ratio advised. | <b>SR-246/362-2S-10</b>          | 3400-7200             | <b>448601<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 246<br>254                                 | 296<br>304                                    | 110                           | 15 51<br>59 15                               | .020<br>.020                | .579<br>.598                  |
| Performance usage, bracket racing, good mid-range torque and HP, Heavy, Pro, etc., auto trans w/race converter, oval track 2-bbl or 4-bbl, 1/4-3/8 mile, 11.0 to 12.5 compression ratio advised.   | <b>R-252/420-2S-8</b>            | 3600-7400             | <b>448801<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 252<br>258                                 | 284<br>290                                    | 108                           | 22 50<br>61 17                               | .020<br>.020                | .672<br>.672                  |
| Performance usage, bracket racing, good mid-range torque and HP, Heavy, Pro, etc., auto trans w/race converter, oval track 2-bbl or 4-bbl, 1/4-3/8 mile, 11.0 to 12.5 compression ratio advised.   | <b>R-254/420-2S2-8</b>           | 3800-7600             | <b>448821<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 254<br>258                                 | 286<br>290                                    | 108                           | 23 51<br>61 17                               | .020<br>.020                | .672<br>.672                  |
| Rough idle, performance usage, w/manifold nitrous system, good mid and upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, 4200-4600 cruise RPM, 11.0 minimum compression ratio advised. Good w/Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised.      | <b>SR-254/374-2S-10</b>          | 3800-7800             | <b>448511<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 254<br>262                                 | 304<br>312                                    | 110                           | 22 52<br>66 16                               | .020<br>.020                | .599<br>.599                  |
| Performance usage, bracket racing, good mid to upper RPM torque and HP, Pro, Super Pro, etc., auto trans w/race converter, oval track, 2-bbl or 4-bbl, 1/4-3/8 mile, 12.0 minimum compression ratio advised.   | <b>R-258/420-2S-8</b>            | 4000-7600             | <b>448831<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 258<br>262                                 | 290<br>294                                    | 108                           | 25 53<br>63 19                               | .020<br>.020                | .672<br>.672                  |
| Rough idle, performance usage, w/large nitrous system, good mid to upper RPM torque & HP, bracket racing, auto trans w/3500+ converter, 11.5 minimum compression ratio advised. Good w/Roots supercharger, 20 lbs. maximum boost w/8.0 maximum compression ratio advised.                                  | <b>R-258/420-2S-10</b>           | 4000-7800             | <b>448861<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 258<br>262                                 | 290<br>294                                    | 110                           | 23 55<br>65 17                               | .020<br>.020                | .672<br>.672                  |
| Performance usage, bracket racing, good mid to upper RPM HP, Pro, Super Pro, etc., auto trans w/race converter, good with small nitrous system, aftermarket cylinder heads advised, 12.0 minimum compression ratio advised.  | <b>R-260/452-2S-10</b>           | 4000-8000             | <b>448301<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 260<br>268                                 | 289<br>300                                    | 112                           | 25 55<br>68 20                               | .020<br>.020                | .723<br>.672                  |
| Performance usage, bracket racing, good mid to upper RPM torque and HP, Pro, Super Pro, etc., auto trans w/race converter, oval track, 2-bbl or 4-bbl, 3/8-1/2 mile, 12.0 minimum compression ratio advised.   | <b>R-262/420-2S3-8</b>           | 4200-7800             | <b>448841<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 262<br>268                                 | 294<br>300                                    | 108                           | 27 55<br>66 22                               | .020<br>.020                | .672<br>.672                  |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Camshafts for engines with 52mm, 52.8mm (2.081"), and 55mm diameter camshaft bearing journals are available on special order.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O. engines, and all 94-97 351 Windsor engines are equipped

with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** Ford 221 thru 302 camshafts can be used in 351 Windsor engines if the engine is changed to 221 thru 302 firing order (1-5-4-2-6-3-7-8). Ford 351W firing order is 1-3-7-2-6-5-4-8.

**NOTE:** In order to effect valve adjustment when using roller lifter camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped).

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our **44975-1** or **44984-1** timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328                                  | See pg. 312       | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|---|--|-------------------|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
|                                | 99893-16 <sup>c</sup> | 99953-16                          | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup>                         | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup><br>95618-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>l</sup>                               | 36750-16 <sup>m</sup><br>86757-16 <sup>n</sup><br>36757-16 <sup>o</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup><br>95618-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>l</sup>                               | 36750-16 <sup>m</sup><br>86757-16 <sup>n</sup><br>36757-16 <sup>o</sup> |
|                                | 99893-16 <sup>c</sup> | 99953-16                          | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup>                         | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup><br>95618-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>l</sup>                               | 36750-16 <sup>m</sup><br>86757-16 <sup>n</sup><br>36757-16 <sup>o</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup><br>95618-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>l</sup>                               | 36750-16 <sup>m</sup><br>86757-16 <sup>n</sup><br>36757-16 <sup>o</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup><br>95618-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>l</sup>                               | 36750-16 <sup>m</sup><br>86757-16 <sup>n</sup><br>36757-16 <sup>o</sup> |
|                                | 99893-16 <sup>c</sup> | 99953-16                          | 99820-16 <sup>c</sup> | 99097-1 <sup>e</sup>                         | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup><br>95618-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>l</sup>                               | 36750-16 <sup>m</sup><br>86757-16 <sup>n</sup><br>36757-16 <sup>o</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup><br>95618-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>l</sup>                               | 36750-16 <sup>m</sup><br>86757-16 <sup>n</sup><br>36757-16 <sup>o</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup><br>95618-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>l</sup>                               | 36750-16 <sup>m</sup><br>86757-16 <sup>n</sup><br>36757-16 <sup>o</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup><br>95618-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>l</sup>                               | 36750-16 <sup>m</sup><br>86757-16 <sup>n</sup><br>36757-16 <sup>o</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>e</sup><br>99087-1 <sup>f</sup> | 95644-16 <sup>g</sup><br>36622-16 <sup>h</sup><br>95618-16 <sup>i</sup> | 44975-1 <sup>j</sup><br>44984-1 <sup>k</sup> |                   | 36774-16 <sup>l</sup>                               | 36750-16 <sup>m</sup><br>86757-16 <sup>n</sup><br>36757-16 <sup>o</sup> |

**Section Continued**

- a** Requires **36970-1** (.467" I.D.), **36971-1** (.500" I.D.), or **44970-1** (.531" I.D. SVO) steel, or **36990-1** (.467" I.D.), **36989-1** (.500" I.D.), or **44990-1** (.531" I.D. SVO), aluminum-bronze distributor drive gear, and 7/16-20 x 1-1/4" grade 8 cam gear bolt and hardened washer.
- b** Ultra Pro Series roller lifters.
- c** Must machine cylinder heads.
- d** Requires Crane Multi Fit valve locks.
- e** Machined steel, heat treated.
- f** Machined steel, heat treated, Multi Fit.
- g** Pro Series one-piece, for 351 engines, for use with or without pushrod guideplate cylinder heads.
- h** For 302 engines, heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- i** Pro Series one-piece, for 302 engines, for use with or without pushrod guideplate cylinder heads.
- j** For 73-93 engines, performance steel billet gears and roller chain set.

- k** For 73-93 engines, Pro Series steel billet gears and roller chain set.
- l** Crane Classic extruded, 1.6 ratio, 3/8" stud, must machine 66-93 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- m** 1.6 ratio, 3/8" stud, must machine 66-93 cylinder heads and install **99156-16** rocker arm studs and **36650-1** pushrod guideplates, or use **36655-16** Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- n** 1.6 ratio, 7/16" stud, must machine 66-93 cylinder heads and install **99157-16** rocker arm studs and **36650-1** pushrod guideplates.
- o** 1.7 ratio, 7/16" stud, must machine 66-93 cylinder heads and install **99157-16** rocker arm studs and **36650-1** pushrod guideplates.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                           | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| Rough idle, performance usage, good w/manifold nitrous system, good upper RPM HP, bracket racing, auto trans w/4000+ converter, 4400-4800 cruise RPM, 11.5 minimum compression ratio advised. Good w/Roots supercharger, 22 lbs. maximum boost w/8.0 maximum compression ratio advised.              | SR-262/374-2S-10                 | 4400-7800             | 448671 <sup>a</sup>                        | 44518-16<br>44570-16 <sup>b</sup> | 262  | 312   | 110                           | 26 56  | .020                        | .598                          |
|  |                                  |                       |  |                                   | 274  | 323   | 72 22                         | .024   | .584                        |                               |
| Competition only, good w/large nitrous system, good mid to upper RPM HP, bracket racing, auto trans w/race converter, 12.0 minimum compression ratio advised. Good w/Roots supercharger, 24 lbs. maximum boost w/8.0 maximum compression ratio advised.  | R-266/420-2S3-10                 | 4600-8000             | 448871 <sup>a</sup>                        | 44518-16<br>44570-16 <sup>b</sup> | 266  | 298   | 110                           | 27 59  | .020                        | .672                          |
|  |                                  |                       |  |                                   | 276  | 308   | 72 24                         | .020   | .672                        |                               |
| Competition only, good mid to upper RPM HP, bracket racing, auto trans w/race converter, 12.0 minimum compression ratio advised, aftermarket aluminum cylinder heads advised, good w/large nitrous system. Good w/Roots supercharger, 24 lbs. maximum boost w/8.0 maximum compression ratio advised. | R-266/452-2S-10                  | 4600-8200             | 448311 <sup>a</sup>                        | 44570-16 <sup>b</sup>             | 266  | 295   | 110                           | 28 58  | .020                        | .746                          |
|  |                                  |                       |  |                                   | 276  | 306   | 73 23                         | .022   | .739                        |                               |
| Performance usage, bracket racing, good upper RPM torque and HP, Super Pro, etc., auto trans w/race converter, oval track, high RPM 3/8-1/2 mile, 12.0 minimum compression ratio advised.  | R-268/420-2S1-8                  | 4800-8200             | 448851 <sup>a</sup>                        | 44518-16<br>44570-16 <sup>b</sup> | 268  | 300   | 108                           | 30 58  | .020                        | .672                          |
|  |                                  |                       |  |                                   | 272  | 304   | 68 24                         | .020   | .672                        |                               |
| Competition only, bracket racing, good upper RPM torque and HP, Super Pro, etc., auto trans w/race converter, aftermarket aluminum cylinder heads advised, 12.0 minimum compression ratio advised.   | R-272/4381-2S1-8                 | 5000-8400             | 448891 <sup>a</sup>                        | 44518-16<br>44570-16 <sup>b</sup> | 272  | 304   | 108                           | 31 61  | .020                        | .701                          |
|  |                                  |                       |  |                                   | 278  | 310   | 70 28                         | .022   | .701                        |                               |
| Competition only, bracket racing, good upper RPM torque and HP, Super Pro, Super Gas, etc., auto trans w/race converter, aftermarket aluminum cylinder heads advised, 12.5 minimum compression ratio advised.  | R-276/4334-2S-8                  | 5200-8400             | 448291 <sup>a</sup>                        | 44518-16<br>44570-16 <sup>b</sup> | 276  | 316   | 108                           | 33 63  | .026                        | .693                          |
|  |                                  |                       |  |                                   | 284  | 284   | 73 31                         | .026   | .683                        |                               |
| Competition only, bracket racing, good upper RPM torque and HP, Super Pro, Super Gas, etc., auto trans w/race converter, aftermarket aluminum cylinder heads advised, 12.5 minimum compression ratio advised.  | R-280/452-2S-10                  | 5400-8600             | 448881 <sup>a</sup>                        | 44570-16 <sup>b</sup>             | 280  | 310   | 110                           | 35 65  | .020                        | .723                          |
|  |                                  |                       |  |                                   | 288  | 320   | 78 30                         | .020   | .672                        |                               |
| Competition only, good upper RPM HP, stick or auto trans w/race converter, designed for large manifold nitrous system, professionally prepared cylinder heads, 13.5 minimum compression ratio advised.   | R-284/466-2S-15                  | 5400-8800             | 448321 <sup>a</sup>                        | 44570-16 <sup>b</sup>             | 284  | 316   | 115                           | 30 74  | .020                        | .746                          |
|  |                                  |                       |  |                                   | 296  | 336   | 87 29                         | .030   | .753                        |                               |
| Competition only, good upper RPM HP, stick or auto trans w/race converter, professionally prepared cylinder heads, 13.5 minimum compression ratio advised.   | R-286/456-2S1-10                 | 5200-8800             | 448331 <sup>a</sup>                        | 44570-16 <sup>b</sup>             | 286  | 326   | 110                           | 36 70  | .026                        | .730                          |
|  |                                  |                       |  |                                   | 290  | 330   | 78 32                         | .026   | .734                        |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Camshafts for engines with 52mm, 52.8mm (2.081"), and 55mm diameter camshaft bearing journals are available on special order.

**NOTE:** Many 1985-87 302 engines, all 88-97 302 passenger car engines, all 96-00 302 truck engines, all 85-95 302 H.O. engines, and all 94-97 351 Windsor engines are equipped with hydraulic roller camshafts and lifters. Conventional hydraulic, mechanical, or roller lifters can be easily installed in these engines, providing the appropriate kit components are used.

**NOTE:** Ford 221 thru 302 camshafts can be used in 351 Windsor engines if the engine is changed to 221 thru 302 firing order (1-5-4-2-6-3-7-8). Ford 351W firing order is 1-3-7-2-6-5-4-8.

**NOTE:** In order to effect valve adjustment when using roller lifter camshafts, the heads must be machined to accept screw-in studs (on engines not originally equipped).

**NOTE:** Some engines have long valve stems which will result in excessive valve spring assembly height. Different springs and retainers may be required to prevent excessive shimming. Contact Crane's Performance consultants for details.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 44975-1 or 44984-1 timing chain and assemblies, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328                                  | See pg. 312       | See pg. 315   | See pg. 317   |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|---|--|-------------------|---|---|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY               | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
|                                | 99893-16 <sup>c</sup> | 99953-16                          | 99820-16 <sup>c</sup> | 99097-1 <sup>f</sup>                         | 95644-16 <sup>h</sup><br>36622-16 <sup>i</sup><br>95618-16 <sup>j</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 36774-16 <sup>o</sup>                               | 36750-16 <sup>n</sup><br>86757-16 <sup>p</sup><br>36757-16 <sup>p</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 95644-16 <sup>h</sup><br>36622-16 <sup>i</sup><br>95618-16 <sup>j</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 36774-16 <sup>m</sup>                               | 36750-16 <sup>n</sup><br>86757-16 <sup>p</sup><br>36757-16 <sup>p</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 95644-16 <sup>h</sup><br>95618-16 <sup>j</sup>                          | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 36774-16 <sup>m</sup>                               | 36750-16 <sup>n</sup><br>86757-16 <sup>p</sup><br>36757-16 <sup>p</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 95644-16 <sup>h</sup><br>36622-16 <sup>i</sup><br>95618-16 <sup>j</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 36774-16 <sup>m</sup>                               | 36750-16 <sup>n</sup><br>86757-16 <sup>p</sup><br>36757-16 <sup>p</sup> |
|                                | 99885-16 <sup>c</sup> | 99956-16<br>99970-16 <sup>d</sup> | 99826-16 <sup>c</sup> | 99097-1 <sup>f</sup><br>99087-1 <sup>g</sup> | 95644-16 <sup>h</sup><br>36622-16 <sup>i</sup><br>95618-16 <sup>j</sup> | 44975-1 <sup>k</sup><br>44984-1 <sup>l</sup> |                   | 36774-16 <sup>m</sup>                               | 36750-16 <sup>n</sup><br>86757-16 <sup>p</sup><br>36757-16 <sup>p</sup> |
|                                | 96886-16 <sup>c</sup> | 99681-16 <sup>e</sup>             | 99826-16 <sup>c</sup> | 99097-1 <sup>f</sup>                         | 95644-16 <sup>h</sup><br>95618-16 <sup>j</sup>                          | 44984-1 <sup>l</sup>                         |                   |   | 36750-16 <sup>n</sup><br>86757-16 <sup>p</sup><br>36757-16 <sup>p</sup> |
|                                | 96886-16 <sup>c</sup> | 99681-16 <sup>e</sup>             | 99826-16 <sup>c</sup> | 99097-1 <sup>f</sup>                         | 95644-16 <sup>h</sup><br>95618-16 <sup>j</sup>                          | 44984-1 <sup>l</sup>                         |                   |   | 36750-16 <sup>n</sup><br>86757-16 <sup>p</sup><br>36757-16 <sup>p</sup> |
|                                | 96886-16 <sup>c</sup> | 99681-16 <sup>e</sup>             | 99826-16 <sup>c</sup> | 99097-1 <sup>f</sup>                         | 95644-16 <sup>h</sup><br>95618-16 <sup>j</sup>                          | 44984-1 <sup>l</sup>                         |                   |   | 36750-16 <sup>n</sup><br>86757-16 <sup>p</sup><br>36757-16 <sup>p</sup> |

- a Requires 36970-1 (.467" I.D.), 36971-1 (.500" I.D.), or 44970-1 (.531" I.D. SVO) steel, or 36990-1 (.467" I.D.), 36989-1 (.500" I.D.), or 44990-1 (.531" I.D. SVO), aluminum-bronze distributor drive gear, and 7/16-20 x 1-1/4" grade 8 cam gear bolt and hardened washer.
- b Ultra Pro Series roller lifters.
- c Must machine cylinder heads.
- d Requires Crane Multi Fit valve locks.
- e Titanium, must use 99097-1 valve stem locks (included with the retainers).
- f Machined steel, heat treated.
- g Machined steel, heat treated, Multi Fit.
- h Pro Series one-piece, for 351 engines, for use with or without pushrod guideplate cylinder heads.
- i For 302 engines, heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- j Pro Series one-piece, for 302 engines, for use with or without pushrod guideplate cylinder heads.
- k For 73-93 engines, performance steel billet gears and roller chain set.
- l For 73-93 engines, Pro Series steel billet gears and roller chain set.

- m Crane Classic extruded, 1.6 ratio, 3/8" stud, must machine 66-93 cylinder heads and install 99156-16 rocker arm studs and 36650-1 pushrod guideplates, or use 36655-16 Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- n 1.6 ratio, 3/8" stud, must machine 66-93 cylinder heads and install 99156-16 rocker arm studs and 36650-1 pushrod guideplates, or use 36655-16 Conversion Kit on 77-93 pedestal mount cylinder heads for street applications.
- o 1.6 ratio, 7/16" stud, must machine 66-93 cylinder heads and install 99157-16 rocker arm studs and 36650-1 pushrod guideplates.
- p 1.7 ratio, 7/16" stud, must machine 66-93 cylinder heads and install 99157-16 rocker arm studs and 36650-1 pushrod guideplates.

### COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code   | LIFTERS   | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|---|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |   |  |   |                               |  |                     |                               |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.  | <b>H-192/2667-2S-14</b>          | 800-4200              | <b>520581*</b>                               | <b>99280-16</b>                                 | 192<br>204                                 | 248<br>260                                    | 114                           | (13) 25<br>41 (17)                           | .000<br>.000        | .461<br>.493                  |
|  |                                  |                       | ◆  |   |  |   |                               |  |                     |                               |
| Good low end torque, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.                                | <b>H-260-2</b>                   | 1200-4800             | <b>523901*</b><br><b>523902*<sup>a</sup></b> | <b>99280-16</b>                                 | 204<br>214                                 | 260<br>276                                    | 112                           | (5) 29<br>44 (10)                            | .000<br>.000        | .493<br>.502                  |
|  |                                  |                       | ◆  |   |  |   |                               |  |                     |                               |
| Good low end torque and HP, smooth idle, daily usage, fuel economy, light towing, off road, 2200-2700 cruise RPM, 8.5 to 10.0 compression ratio advised.                                     | <b>Energizer<br/>266 H10</b>     | 1400-4800             | <b>13303*</b><br><b>133032*<sup>b</sup></b>  | <b>99280-16</b>                                 | 210<br>210                                 | 266<br>266                                    | 110                           | 0 30<br>40 (10)                              | .000<br>.000        | .508<br>.508                  |
|  |                                  |                       | ◆  |   |  |   |                               |  |                     |                               |
| Excellent low end and mid range torque and HP, good idle, daily usage, off road, towing, fuel economy, 2400-2800 cruise RPM, 8.5 to 10.0 compression ratio advised.                          | <b>H-266-2</b>                   | 1500-5000             | <b>523921*</b><br><b>523922*<sup>a</sup></b> | <b>99280-16</b>                                 | 210<br>218                                 | 266<br>280                                    | 112                           | (2) 32<br>46 (8)                             | .000<br>.000        | .508<br>.510                  |
|  |                                  |                       | ◆  |   |  |   |                               |  |                     |                               |
| Good low end and mid range torque and HP, good idle, daily usage, off road, highway towing, fuel efficiency plus performance, 2600-3000 cruise RPM, 8.75 to 10.0 compression ratio advised.  | <b>Energizer<br/>272 H10</b>     | 1600-5200             | <b>13304*</b><br><b>133042*<sup>a</sup></b>  | <b>99280-16</b>                                 | 216<br>216                                 | 272<br>272                                    | 110                           | 3 33<br>43 (7)                               | .000<br>.000        | .524<br>.524                  |
|  |                                  |                       | ◆  |   |  |   |                               |  |                     |                               |
| Good low end and mid range torque, good idle, daily usage and off road, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.               | <b>H-272-2</b>                   | 1800-5400             | <b>523941*</b><br><b>523942*<sup>b</sup></b> | <b>99280-16</b>                                 | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000        | .524<br>.519                  |
|  |                                  |                       | ◆  |   |  |   |                               |  |                     |                               |
| Good mid range torque and HP, good to fair idle, daily usage, mild bracket racing, auto trans w/2500+ converter, 2700-3200 cruise RPM, 9.5 to 10.75 compression ratio advised.               | <b>Energizer<br/>278 H10</b>     | 2200-5600             | <b>13313*</b><br><b>133132*<sup>a</sup></b>  | <b>99280-16</b><br><b>99380-16*<sup>c</sup></b> | 222<br>222                                 | 278<br>278                                    | 110                           | 6 36<br>46 (4)                               | .000<br>.000        | .539<br>.539                  |
|  |                                  |                       | ◆  |   |  |   |                               |  |                     |                               |
| Good mid range torque and HP, good idle, daily performance usage, mild bracket racing, auto trans w/2000+ converter, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.           | <b>H-278-2</b>                   | 2200-5800             | <b>523801*</b><br><b>523802*<sup>a</sup></b> | <b>99280-16</b><br><b>99380-16*<sup>c</sup></b> | 222<br>234                                 | 278<br>290                                    | 114                           | 2 40<br>56 (2)                               | .000<br>.000        | .539<br>.534                  |
|  |                                  |                       | ◆  |   |  |   |                               |  |                     |                               |
| Rough idle, moderate performance usage, limited oval track, bracket racing, auto trans w/3000+ converter, 9.5 to 11.0 compression ratio advised.   | <b>H-226/314-2S-6</b>            | 2400-6000             | <b>520341*</b>                               | <b>99280-16</b><br><b>99380-16*<sup>c</sup></b> | 226<br>230                                 | 286<br>290                                    | 106                           | 11 35<br>45 5                                | .000<br>.000        | .543<br>.550                  |
|  |                                  |                       | ◆  |   |  |   |                               |  |                     |                               |
| Good mid range to upper RPM torque and HP, fair idle, moderate performance usage, bracket racing, auto trans w/2500+ converter, 3200-3600 cruise RPM, 9.5 to 11.0 compression ratio advised. | <b>H-288-2</b>                   | 2400-6200             | <b>524421*</b><br><b>524422*<sup>a</sup></b> | <b>99280-16</b><br><b>99380-16*<sup>c</sup></b> | 226<br>230                                 | 288<br>292                                    | 110                           | 8 38<br>50 0                                 | .000<br>.000        | .528<br>.536                  |
|  |                                  |                       | ◆  |   |  |   |                               |  |                     |                               |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**IMPORTANT:** If your hydraulic lifter preload is excessive, this can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**IMPORTANT:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (52655-16) for street applications, enabling the 351C-351M-400 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. See page 325 for details.

**NOTE:** To provide the most accurate valve adjustment on hydraulic lifter camshafts, the heads must be machined to accept 99159-16 screw-in studs and 52650-1 pushrod guideplates. Special length pushrods can be ordered to provide proper hydraulic lifter preload. Refer to page 305 for special pushrod ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 52975-1 timing chain and gear assembly, a pre-1972 crankshaft sprocket, or degreering in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**IMPORTANT NOTE:** Many problems can occur if the proper valve spring retainers are not used on 351C-351M and 400 cu.in. engines. Ford made a number of production changes in these engines, possibly causing a misapplication of parts. Please refer to page 195 to insure that the proper components are being used.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>                           | <i>See pg. 337</i>                             | <i>See pg. 350</i>   | <i>See pg. 362</i> | <i>See pg. 360</i>                           | <i>See pg. 306</i>                             | <i>See pg. 328</i>             | <i>See pg. 312</i>    | <i>See pg. 315</i>                                  | <i>See pg. 317</i>                             |
|--|--|--|--------------------|--|--|--------------------------------|-----------------------|---|--|
| VALVE SPRING AND RETAINER KITS               | VALVE SPRINGS                                  | RETAINERS  | VALVE STEM SEALS   | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS     | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
| 52308-1 <sup>d</sup><br>35308-1 <sup>e</sup> | 96801-16 <sup>f</sup><br>99839-16 <sup>g</sup> | 99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup>                          |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |
| 52308-1 <sup>d</sup><br>35308-1 <sup>e</sup> | 96801-16 <sup>f</sup><br>99839-16 <sup>g</sup> | 99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup>                          |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |
| 52308-1 <sup>d</sup><br>35308-1 <sup>e</sup> | 96801-16 <sup>f</sup><br>99839-16 <sup>g</sup> | 99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup>                          |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |
| 52308-1 <sup>d</sup><br>35308-1 <sup>e</sup> | 96801-16 <sup>f</sup><br>99839-16 <sup>g</sup> | 99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup>                          |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |
| 52308-1 <sup>d</sup><br>35308-1 <sup>e</sup> | 96801-16 <sup>f</sup><br>99839-16 <sup>g</sup> | 99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup>                          |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |
| 52308-1 <sup>d</sup><br>35308-1 <sup>e</sup> | 96801-16 <sup>f</sup><br>99839-16 <sup>g</sup> | 99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup>                          |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |
| 52308-1 <sup>d</sup><br>35308-1 <sup>e</sup> | 96801-16 <sup>f</sup><br>99839-16 <sup>g</sup> | 99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup>                          |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |
| 52308-1 <sup>d</sup><br>35308-1 <sup>e</sup> | 96801-16 <sup>f</sup><br>99839-16 <sup>g</sup> | 99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup>                          |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |
| 52308-1 <sup>d</sup><br>35308-1 <sup>e</sup> | 96801-16 <sup>f</sup><br>99839-16 <sup>g</sup> | 99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup>                          |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |
|  |  | 96877-16 <sup>h</sup><br>99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup> |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |
| 52308-1 <sup>d</sup><br>35308-1 <sup>e</sup> | 96801-16 <sup>f</sup><br>99839-16 <sup>g</sup> | 99944-16 <sup>i</sup><br>99948-16 <sup>j</sup><br>99969-16 <sup>k</sup>                          |                    | 99097-1 <sup>l</sup><br>99094-1 <sup>m</sup> | 52621-16 <sup>n</sup><br>95650-16 <sup>o</sup> | 52975-1 <sup>p</sup>           | 52800-16 <sup>q</sup> | 27774-16 <sup>r</sup><br>27744-16 <sup>s</sup>      | 27750-16 <sup>t</sup><br>27771-16 <sup>u</sup> |

**Section Continued**

- a Cam and Lifter Kit, includes installation lubricants.
- b Cam and Lifter Kit, includes assembly lubricant
- c Optional Hi Intensity hydraulic lifters, see page 292 for details.
- d For 70-77 351C-351M-400 engines, contains standard diameter valve springs, no machining required.
- e For 71-72 Boss 351 and 79-82 351M-400 engines, contains standard diameter valve springs, no machining required.
- f Standard diameter valve springs, no machining required.
- g Optional high rate 1.800" assembly height springs.
- h Must machine cylinder heads.
- i 11/32" type, see **IMPORTANT NOTE** for correct application.
- j 3/8" type, see **IMPORTANT NOTE** for correct application.
- k Requires Crane Multi Fit valve locks.
- l Machined steel, heat treated 11/32" single groove type, see **IMPORTANT NOTE** for correct application.
- m Machined steel, heat treated, Multi Fit 11/32" single groove type, see **IMPORTANT NOTE** for correct application.
- n For 70-74 351C, heavy wall, heat treated, for use with or without pushrod guideplate cylinder heads.
- o Pro Series one-piece, for 71-72 Boss 351, for use with or without pushrod guideplate cylinder heads.
- p Performance steel billet gears and roller chain set.
- q 1.71 ratio, for 351C-351M-400 engines, pedestal mount, non-adjustable.
- r Crane Classic extruded, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.
- s Energizer 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.
- t 1.73 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.
- u 1.73 ratio Wide Body, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.

### COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |  |  |   |                               |  |                     |                               |
| Good mid range HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised.  | <b>Energizer<br/>284 H12</b>     | 2600-<br>6400         | <b>13305*</b><br><b>133052<sup>a</sup></b> | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 228<br>228                                 | 284<br>284                                    | 112                           | 7 41<br>51 (3)                               | .000<br>.000        | .554<br>.554                  |
| Good mid range to upper RPM HP, fair idle, moderate performance usage, bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 10.0 to 11.5 compression ratio advised. Good w/nitrous, also mild supercharged. | <b>H-292-2</b>                   | 2800-<br>6600         | <b>524551*</b>                             | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 230<br>234                                 | 292<br>296                                    | 114                           | 6 44<br>56 (2)                               | .000<br>.000        | .536<br>.545                  |
| Good upper RPM HP, rough idle, performance usage, bracket racing, oval track 3/8-1/2 mile, auto trans w/3000+ converter, 3400-3800 cruise RPM, 10.75 to 12.5 compression ratio advised.                                    | <b>H-238/3347-10</b>             | 3200-<br>6800         | <b>520641*</b>                             | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 238<br>238                                 | 294<br>294                                    | 110                           | 14 44<br>54 4                                | .000<br>.000        | .579<br>.579                  |
| Rough idle, performance usage, good upper RPM HP, bracket racing, auto trans w/3500+ converter, 11.25 to 13.0 compression ratio advised.   | <b>H-250/340-2S-10</b>           | 3600-<br>7200         | <b>520651*</b>                             | <b>99280-16</b><br><b>99380-16<sup>d</sup></b> | 250<br>254                                 | 310<br>314                                    | 110                           | 20 50<br>62 12                               | .000<br>.000        | .588<br>.595                  |
| <b>Hydraulic Roller Camshafts — Retrofit</b>   |                                  |                       |  |  |  |   |                               |  |                     |                               |
| Excellent low end torque and HP, good idle, daily usage, performance and fuel efficiency, off road, towing, mild turbocharged, 2400-3200 cruise RPM, 8.75 to 10.0 compression ratio advised.                               | <b>HR-216/325-2S-12</b>          | 1600-<br>5600         | <b>529541<sup>b,c</sup></b>                | <b>36532-16<sup>e</sup></b>                    | 216<br>224                                 | 278<br>286                                    | 112                           | 1 35<br>49 (5)                               | .000<br>.000        | .562<br>.586                  |
| Good low and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2000+ converter, 2800-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.                              | <b>HR-224/339-2S-12</b>          | 2000-<br>6000         | <b>529551<sup>b,c</sup></b>                | <b>36532-16<sup>e</sup></b>                    | 224<br>232                                 | 286<br>294                                    | 112                           | 5 39<br>53 (1)                               | .000<br>.000        | .586<br>.609                  |
| Good mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3200-3800 cruise RPM, 10.0 to 11.5 compression ratio advised.                                      | <b>HR-228/345-2S-12</b>          | 2500-<br>6500         | <b>529801<sup>b,c</sup></b>                | <b>36532-16<sup>e</sup></b>                    | 228<br>232                                 | 290<br>294                                    | 112                           | 7 41<br>53 (1)                               | .000<br>.000        | .597<br>.609                  |
| Good mid range to upper RPM torque and HP, rough idle, radical street, bracket racing, auto trans w/2500+ converter, 3400-4000 cruise RPM, 10.0 to 11.5 compression ratio advised.   | <b>HR-232/352-2S-10</b>          | 2600-<br>6800         | <b>529821<sup>b,c</sup></b>                | <b>36532-16<sup>e</sup></b>                    | 232<br>236                                 | 294<br>298                                    | 110                           | 11 41<br>53 3                                | .000<br>.000        | .609<br>.621                  |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, mild bracket racing, auto trans w/3000+ converter, 3600-4200 cruise RPM, 10.5 to 12.0 compression ratio advised.                                 | <b>HR-236/359-2S-12</b>          | 3000-<br>7000         | <b>529811<sup>b,c</sup></b>                | <b>36532-16<sup>e</sup></b>                    | 236<br>240                                 | 298<br>302                                    | 112                           | 11 45<br>57 3                                | .000<br>.000        | .621<br>.631                  |
| Rough idle, performance usage, good upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, 4200-5000 cruise RPM, good with aftermarket cylinder heads, 11.0 to 12.5 compression ratio advised.             | <b>HR-240/365-2S-10</b>          | 3200-<br>7200         | <b>529831<sup>b,c</sup></b>                | <b>36532-16<sup>e</sup></b>                    | 240<br>244                                 | 302<br>306                                    | 110                           | 15 45<br>57 7                                | .000<br>.000        | .631<br>.644                  |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**IMPORTANT:** If your hydraulic lifter preload is excessive, this can be easily remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**IMPORTANT:** Crane offers a Pushrod Guideplate and Rocker Arm Stud Conversion Kit (52655-16) for street applications, enabling the 351C-351M-400 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. See page 325 for details.

**NOTE:** To provide the most accurate valve adjustment on hydraulic lifter and hydraulic roller camshafts, the heads must be machined to accept 99159-16 screw-in studs and 52650-1 pushrod guideplates. Special length pushrods can be ordered to provide proper hydraulic lifter preload. Refer to page 305 for special pushrod ordering instructions and page 374 for checking your hydraulic lifter preload.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 52975-1 timing chain and gear assembly, a pre-1972 crankshaft sprocket, or degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**IMPORTANT NOTE:** Many problems can occur if the proper valve spring retainers are not used on 351C-351M and 400 cu.in. engines. Ford made a number of production changes in these engines, possibly causing a misapplication of parts. Please refer to page 195 to insure that the proper components are being used.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350   | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328                    | See pg. 312           | See pg. 315                                    | See pg. 317                                    |
|--------------------------------|-----------------------|---|-----------------------|--|---|--------------------------------|-----------------------|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS     | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE                            |
|                                | 96877-16 <sup>f</sup> | 99944-16 <sup>g</sup><br>99948-16 <sup>h</sup><br>99969-16 <sup>i</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>j</sup><br>99094-1 <sup>k</sup> | 52621-16 <sup>m</sup><br>95650-16 <sup>n</sup>                          | 52975-1 <sup>r</sup>           | 52800-16 <sup>s</sup> | 27774-16 <sup>t</sup><br>27744-16 <sup>u</sup> | 27750-16 <sup>v</sup><br>27771-16 <sup>w</sup> |
|                                | 96877-16 <sup>f</sup> | 99944-16 <sup>g</sup><br>99948-16 <sup>h</sup><br>99969-16 <sup>i</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>j</sup><br>99094-1 <sup>k</sup> | 52621-16 <sup>m</sup><br>95650-16 <sup>n</sup>                          | 52975-1 <sup>r</sup>           | 52800-16 <sup>s</sup> | 27774-16 <sup>t</sup><br>27744-16 <sup>u</sup> | 27750-16 <sup>v</sup><br>27771-16 <sup>w</sup> |
|                                | 96877-16 <sup>f</sup> | 99944-16 <sup>g</sup><br>99948-16 <sup>h</sup><br>99969-16 <sup>i</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>j</sup><br>99094-1 <sup>k</sup> | 52621-16 <sup>m</sup><br>95650-16 <sup>n</sup>                          | 52975-1 <sup>r</sup>           | 52800-16 <sup>s</sup> | 27774-16 <sup>t</sup><br>27744-16 <sup>u</sup> | 27750-16 <sup>v</sup><br>27771-16 <sup>w</sup> |
|                                | 96877-16 <sup>f</sup> | 99944-16 <sup>g</sup><br>99948-16 <sup>h</sup><br>99969-16 <sup>i</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>j</sup><br>99094-1 <sup>k</sup> | 52621-16 <sup>m</sup><br>95650-16 <sup>n</sup>                          | 52975-1 <sup>r</sup>           | 52800-16 <sup>s</sup> | 27774-16 <sup>t</sup><br>27744-16 <sup>u</sup> | 27750-16 <sup>v</sup><br>27771-16 <sup>w</sup> |
|                                | 99890-16 <sup>f</sup> | 99970-16 <sup>i</sup>   | 99820-16 <sup>f</sup> | 99094-1 <sup>k</sup>                         | 95654-16 <sup>o</sup><br>95658-16 <sup>p</sup><br>95636-16 <sup>q</sup> | 52975-1 <sup>r</sup>           | 52800-16 <sup>s</sup> | 27774-16 <sup>t</sup><br>27744-16 <sup>u</sup> | 27750-16 <sup>v</sup><br>27771-16 <sup>w</sup> |
|                                | 99890-16 <sup>f</sup> | 99970-16 <sup>i</sup>   | 99820-16 <sup>f</sup> | 99094-1 <sup>k</sup>                         | 95654-16 <sup>o</sup><br>95658-16 <sup>p</sup><br>95636-16 <sup>q</sup> | 52975-1 <sup>r</sup>           | 52800-16 <sup>s</sup> | 27774-16 <sup>t</sup><br>27744-16 <sup>u</sup> | 27750-16 <sup>v</sup><br>27771-16 <sup>w</sup> |
|                                | 99890-16 <sup>f</sup> | 99970-16 <sup>i</sup>   | 99820-16 <sup>f</sup> | 99094-1 <sup>k</sup>                         | 95654-16 <sup>o</sup><br>95658-16 <sup>p</sup><br>95636-16 <sup>q</sup> | 52975-1 <sup>r</sup>           | 52800-16 <sup>s</sup> | 27774-16 <sup>t</sup><br>27744-16 <sup>u</sup> | 27750-16 <sup>v</sup><br>27771-16 <sup>w</sup> |
|                                | 99890-16 <sup>f</sup> | 99970-16 <sup>i</sup>   | 99820-16 <sup>f</sup> | 99094-1 <sup>k</sup>                         | 95654-16 <sup>o</sup><br>95658-16 <sup>p</sup><br>95636-16 <sup>q</sup> | 52975-1 <sup>r</sup>           | 52800-16 <sup>s</sup> | 27774-16 <sup>t</sup><br>27744-16 <sup>u</sup> | 27750-16 <sup>v</sup><br>27771-16 <sup>w</sup> |
|                                | 99890-16 <sup>f</sup> | 99970-16 <sup>i</sup>   | 99820-16 <sup>f</sup> | 99094-1 <sup>k</sup>                         | 95654-16 <sup>o</sup><br>95658-16 <sup>p</sup><br>95636-16 <sup>q</sup> | 52975-1 <sup>r</sup>           | 52800-16 <sup>s</sup> | 27774-16 <sup>t</sup><br>27744-16 <sup>u</sup> | 27750-16 <sup>v</sup><br>27771-16 <sup>w</sup> |
|                                | 99890-16 <sup>f</sup> | 99970-16 <sup>i</sup>   | 99820-16 <sup>f</sup> | 99094-1 <sup>k</sup>                         | 95654-16 <sup>o</sup><br>95658-16 <sup>p</sup><br>95636-16 <sup>q</sup> | 52975-1 <sup>r</sup>           | 52800-16 <sup>s</sup> | 27774-16 <sup>t</sup><br>27744-16 <sup>u</sup> | 27750-16 <sup>v</sup><br>27771-16 <sup>w</sup> |

- a Cam and Lifter Kit, includes assembly lubricant.
- b Camshaft has standard base circle diameter, for use with 36532-16 hydraulic roller lifters.
- c Requires 52970-1 (.500" I.D.) or 52971-1 (.531" I.D.) steel or 52990-1 (.500" I.D.) or 52989-1 (.531" I.D.) aluminum-bronze distributor drive gear.
- d Optional Hi Intensity hydraulic lifters, see page 292 for details.
- e Vertical locking bar hydraulic roller lifters, no machining required. Appropriate pushrods required.
- f Must machine cylinder heads.
- g 11/32" type, see **IMPORTANT NOTE** for correct application.
- h 3/8" type, see **IMPORTANT NOTE** for correct application.
- i Requires Crane Multi Fit valve locks with 11/32" single groove valve stems.
- j Machined steel, heat treated 11/32" single groove type, see **IMPORTANT NOTE** for correct application.
- k Machined steel, heat treated, Multi Fit 11/32" single groove type, see **IMPORTANT NOTE** for correct application.
- l Multi Fit type retainers. Use 99094-1 valve stem locks for single groove 11/32" applications, and standard valve stem locks for multiple groove 3/8" type applications. See **IMPORTANT NOTE** for correct application.
- m For 70-74 351C, heavy wall, heat treated.
- n Pro Series one-piece, for 71-72 Boss 351.
- o Pro Series, one-piece, for 71-82 351M-400 engines with non-adjustable pedestal-mount rocker arms.
- p Pro Series, one-piece, for 71-82 351M-400 engines with adjustable rocker arms with Crane's Pushrod Guideplate Conversion Kit (52655-16). See page 325 for details.
- q Pro Series, one-piece, for 70-74 351C engines with adjustable rocker arms with Crane's Pushrod Guideplate Conversion Kit (52655-16). See page 325 for details.
- r Performace steel billet gears and roller chain set.
- s 1.71 ratio, for 351C-351M-400 engines, pedestal mount, non-adjustable.
- t Crane Classic extruded, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.
- u EnergiZER 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.
- v 1.73 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.
- w 1.73 ratio Wide Body, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.

### COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number   | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS         | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|------------------------------------|-----------------------|--|-----------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Lifter Camshafts</b>  |                                    |                       |  |                 |  |   |                               |  |                             |                               |
| Replacement for factory Boss 351 camshaft.  | <b>BluePrinted<br/>D1ZZ-6250-B</b> | 2000-<br>6000         | <b>520321*</b>                             | <b>99257-16</b> | 228<br>228                                 | 294<br>294                                    | 109                           | 3 45<br>55 (7)                               | .024<br>.026                | .502<br>.502                  |
|   |                                    |                       | ◆  |                 |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, limited oval track, mild bracket racing, auto trans w/2000+ converter, 3200-3600 cruise RPM, 10.0 to 11.0 compression ratio advised.                         | <b>F-232/330-2S-8</b>              | 2800-<br>6600         | <b>521131*</b>                             | <b>99257-16</b> | 232<br>238                                 | 264<br>270                                    | 108                           | (5) 29<br>44 (10)                            | .020<br>.022                | .571<br>.581                  |
|   |                                    |                       | ◆  |                 |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, limited oval track, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 10.5 to 11.5 compression ratio advised.                         | <b>F-238/3200-2-8</b>              | 2800-<br>6600         | <b>521141*</b>                             | <b>99257-16</b> | 238<br>248                                 | 300<br>310                                    | 108                           | 16 42<br>57 11                               | .022<br>.022                | .554<br>.577                  |
|   |                                    |                       | ◆  |                 |  |   |                               |  |                             |                               |
| Good mid range torque and HP, rough idle, performance usage, short oval track, bracket racing, auto trans w/3500+ converter, 11.0 to 12.5 compression ratio advised.  | <b>F-246/3294-2-8</b>              | 3200-<br>7000         | <b>521211*</b>                             | <b>99257-16</b> | 246<br>256                                 | 282<br>292                                    | 108                           | 18 48<br>59 17                               | .026<br>.026                | .570<br>.590                  |
|   |                                    |                       | ◆  |                 |  |   |                               |  |                             |                               |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/race converter, also mild nitrous, mild supercharged, 11.5 minimum compression ratio advised.  | <b>F-256/3634-2S1-10</b>           | 4000-<br>7500         | <b>521321*</b>                             | <b>99257-16</b> | 256<br>266                                 | 292<br>302                                    | 110                           | 22 54<br>66 20                               | .026<br>.026                | .629<br>.610                  |
|   |                                    |                       | ◆  |                 |  |   |                               |  |                             |                               |
| Good mid range to upper RPM HP, performance usage, 1/4 - 1/2 mile oval track, bracket racing, auto trans w/race converter, 11.5 minimum compression ratio advised.  | <b>F-260/3694-6</b>                | 4200-<br>7600         | <b>521421*</b>                             | <b>99257-16</b> | 260<br>260                                 | 296<br>296                                    | 106                           | 26 54<br>58 22                               | .026<br>.026                | .639<br>.639                  |
|   |                                    |                       | ◆  |                 |  |   |                               |  |                             |                               |
| Competition only, good mid and upper RPM torque and HP, flat tappet restricted classes, bracket racing, 1/2 - 5/8 mile oval track, good with aftermarket cylinder heads, auto trans w/race converter, 12.0 minimum compression ratio advised. | <b>F-266/400-2S-8</b>              | 4600-<br>8000         | <b>521501*</b>                             | <b>99257-16</b> | 266<br>276                                 | 298<br>312                                    | 108                           | 30 56<br>70 26                               | .018<br>.018                | .692<br>.702                  |
|   |                                    |                       | ◆  |                 |  |   |                               |  |                             |                               |
| Radical competition only, good upper RPM torque and HP, flat tappet restricted classes, bracket racing, good with aftermarket cylinder heads, auto trans w/race converter, 12.5 minimum compression ratio advised.                            | <b>F-276/3934-8</b>                | 4800-<br>8200         | <b>521631*</b>                             | <b>99257-16</b> | 276<br>276                                 | 312<br>312                                    | 108                           | 33 63<br>69 27                               | .026<br>.026                | .681<br>.681                  |
|   |                                    |                       | ◆  |                 |  |   |                               |  |                             |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** In order to effect valve adjustment on 351C-351M-400 cu.in. engines when using mechanical lifter camshafts, the heads must be machined to accept **99159-16** screw-in studs and

**52650-1** pushrod guideplates.

**NOTE:** On engines with cylinder heads equipped with exhaust valve rotators, valve springs and retainers must be changed to allow for proper valve travel.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our **52975-1** timing chain and gear assembly, a pre-1972 crankshaft

sprocket, or degreasing in your camshaft. The **non-retarded** sprocket will have the alignment dot and keyway slot directly in line with each other.

**IMPORTANT NOTE:** Many problems can occur if the proper valve spring retainers are not used on 351C-351M and 400 cu.in. engines. Ford made a number of production changes in these engines, possibly causing a misapplication of parts. Please refer to page 195 to insure that the proper components are being used.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350           | See pg. 362           | See pg. 360          | See pg. 306                                    | See pg. 328                    | See pg. 312       | See pg. 315                         | See pg. 317                                    |
|--------------------------------|-----------------------|-----------------------|-----------------------|----------------------|--|--------------------------------|-------------------|-------------------------------------|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS             | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ ENERGIZER | ROCKERS — GOLD RACE                            |
|                                | 96870-16 <sup>a</sup> | 99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99094-1 <sup>c</sup> | 52621-16 <sup>d</sup><br>95650-16 <sup>e</sup> | 52975-1 <sup>f</sup>           |                   | 27774-16 <sup>g</sup>               | 27750-16 <sup>h</sup><br>27771-16 <sup>i</sup> |
|                                | 96870-16 <sup>a</sup> | 99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99094-1 <sup>c</sup> | 52621-16 <sup>d</sup><br>95650-16 <sup>e</sup> | 52975-1 <sup>f</sup>           |                   | 27774-16 <sup>g</sup>               | 27750-16 <sup>h</sup><br>27771-16 <sup>i</sup> |
|                                | 96870-16 <sup>a</sup> | 99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99094-1 <sup>c</sup> | 52621-16 <sup>d</sup><br>95650-16 <sup>e</sup> | 52975-1 <sup>f</sup>           |                   | 27774-16 <sup>g</sup>               | 27750-16 <sup>h</sup><br>27771-16 <sup>i</sup> |
|                                | 96870-16 <sup>a</sup> | 99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99094-1 <sup>c</sup> | 52621-16 <sup>d</sup><br>95650-16 <sup>e</sup> | 52975-1 <sup>f</sup>           |                   | 27774-16 <sup>g</sup>               | 27750-16 <sup>h</sup><br>27771-16 <sup>i</sup> |
|                                | 96870-16 <sup>a</sup> | 99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99094-1 <sup>c</sup> | 52621-16 <sup>d</sup><br>95650-16 <sup>e</sup> | 52975-1 <sup>f</sup>           |                   | 27774-16 <sup>g</sup>               | 27750-16 <sup>h</sup><br>27771-16 <sup>i</sup> |
|                                | 96870-16 <sup>a</sup> | 99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99094-1 <sup>c</sup> | 52621-16 <sup>d</sup><br>95650-16 <sup>e</sup> | 52975-1 <sup>f</sup>           |                   | 27774-16 <sup>g</sup>               | 27750-16 <sup>h</sup><br>27771-16 <sup>i</sup> |
|                                | 96870-16 <sup>a</sup> | 99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99094-1 <sup>c</sup> | 52621-16 <sup>d</sup><br>95650-16 <sup>e</sup> | 52975-1 <sup>f</sup>           |                   | 27774-16 <sup>g</sup>               | 27750-16 <sup>h</sup><br>27771-16 <sup>i</sup> |
|                                | 96870-16 <sup>a</sup> | 99969-16 <sup>b</sup> | 99820-16 <sup>a</sup> | 99094-1 <sup>c</sup> | 52621-16 <sup>d</sup><br>95650-16 <sup>e</sup> | 52975-1 <sup>f</sup>           |                   | 27774-16 <sup>g</sup>               | 27750-16 <sup>h</sup><br>27771-16 <sup>i</sup> |

- a** Must machine cylinder heads.
- b** Requires appropriate Crane Multi Fit valve locks, see **IMPORTANT NOTE** for correct application.
- c** Machined steel, heat treated, Multi Fit 11/32" single groove type, see **IMPORTANT NOTE** for correct application.
- d** For 70-74 351C, heavy wall, heat treated, for use with pushrod guideplate cylinder heads.
- e** Pro Series one piece, for 71-72 Boss 351, for use with pushrod guideplate cylinder heads.
- f** Performance steel billet gears and roller chain set.
- g** Crane Classic extruded, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.
- h** 1.73 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.
- i** 1.73 ratio Wide Body, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.

### COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b>   |                                  |                       |  |  |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 10.5 to 11.5 compression ratio advised.  | <b>SR-238/350-2S-12</b>          | 2800-6800             | <b>528511<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 238<br>246                                 | 288<br>296                                    | 112                           | 12 46<br>60 6                                | .020<br>.020                | .606<br>.626                  |
| Good mid range torque and HP, rough idle, moderate performance usage, short oval track, bracket racing, auto trans w/3000+ converter, 11.0 to 12.5 compression ratio advised.                      | <b>R-246/3236-2-8</b>            | 3200-7200             | <b>528371<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 246<br>256                                 | 284<br>294                                    | 108                           | 20 46<br>61 15                               | .024<br>.026                | .560<br>.585                  |
| Good mid range torque and HP, rough idle, moderate performance usage, mild bracket racing, auto trans w/3000+ converter, 3600-4000 cruise RPM, 11.0 to 12.0 compression ratio advised.             | <b>SR-246/362-2S-12</b>          | 3200-7200             | <b>528521<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 246<br>254                                 | 296<br>304                                    | 112                           | 16 50<br>64 10                               | .020<br>.020                | .626<br>.647                  |
| Good mid range torque and HP, rough idle, performance usage, oval track, bracket racing, auto trans w/race converter, 11.5 to 12.5 compression ratio advised.                                      | <b>R-252/420-2-8</b>             | 3600-7600             | <b>528801<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 252<br>262                                 | 284<br>294                                    | 108                           | 22 50<br>63 19                               | .020<br>.020                | .727<br>.727                  |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, oval track, bracket racing, auto trans w/race converter, 12.0 minimum compression ratio advised.                         | <b>R-262/420-2-8</b>             | 4000-8000             | <b>528811<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 262<br>272                                 | 294<br>304                                    | 108                           | 27 55<br>68 24                               | .020<br>.020                | .727<br>.727                  |
| Competition only, good mid range to upper RPM torque and HP, bracket racing, NMRA, NMCA, auto trans w/race converter, 12.5 minimum compression ratio advised.                                      | <b>R-262/4381-2S-8</b>           | 4200-8200             | <b>528411<sup>a</sup></b>                  | <b>44518-16</b><br><b>44570-16<sup>b</sup></b> | 262<br>268                                 | 294<br>300                                    | 108                           | 26 56<br>65 23                               | .026<br>.022                | .758<br>.758                  |
| Competition only, good upper RPM HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.  | <b>R-272/420-2-8</b>             | 4400-8200             | <b>528821<sup>a</sup></b>                  | <b>44570-16<sup>b</sup></b>                    | 272<br>282                                 | 304<br>314                                    | 108                           | 32 60<br>73 29                               | .020<br>.020                | .727<br>.727                  |
| Radical competition only, good upper RPM HP, bracket racing, NMCA, NMRA, good with nitrous, auto trans w/race converter, 13.5 minimum compression ratio advised.                                   | <b>R-278/5002-2S-12</b>          | 4600-8400             | <b>528831<sup>a</sup></b>                  | <b>44570-16<sup>b</sup></b>                    | 278<br>292                                 | 306<br>320                                    | 112                           | 32 66<br>83 29                               | .020<br>.022                | .865<br>.865                  |
| Radical competition only, good upper RPM HP, bracket racing, NMCA, NMRA, good w/ 400+ cu.in. and after-market cylinder heads, auto trans w/race converter, 14.0 minimum compression ratio advised. | <b>R-282/5001-2S-10</b>          | 5000-8800             | <b>528841<sup>a</sup></b>                  | <b>44570-16<sup>b</sup></b>                    | 282<br>286                                 | 314<br>318                                    | 110                           | 33.5 68.5<br>78 28                           | .020<br>.016                | .865<br>.832                  |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** In order to effect valve adjustment on 351C-351M-400 cu.in. engines when using roller lifter camshafts, the heads must be machined to accept **99159-16** screw-in studs & **52650-1** pushrod guideplates.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our **52975-1** timing chain and gear assembly, a pre-1972 crankshaft sprocket, or degreeing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**IMPORTANT NOTE:** Many problems can occur if the proper valve spring retainers are not used on 351C-351M and 400 cu.in. engines. Ford made a number of production changes in these engines, possibly causing a misapplication of parts. Please refer to page 195 to insure that the proper components are being used.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                       | See pg. 350                                    | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                    | See pg. 312       | See pg. 315                         | See pg. 317                                    |
|--------------------------------|---|--|-----------------------|--|--|--------------------------------|-------------------|-------------------------------------|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                     | RETAINERS                                      | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ ENERGIZER | ROCKERS — GOLD RACE                            |
|                                | 99893-16 <sup>c</sup>                             | 99953-16 <sup>e</sup><br>99954-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 52621-16 <sup>k</sup><br>95650-16 <sup>l</sup> | 52975-1 <sup>m</sup>           |                   | 27774-16 <sup>n</sup>               | 27750-16 <sup>o</sup><br>27771-16 <sup>p</sup> |
|                                | 99893-16 <sup>c</sup>                             | 99953-16 <sup>e</sup><br>99954-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 52621-16 <sup>k</sup><br>95650-16 <sup>l</sup> | 52975-1 <sup>m</sup>           |                   | 27774-16 <sup>n</sup>               | 27750-16 <sup>o</sup><br>27771-16 <sup>p</sup> |
|                                | 99893-16 <sup>c</sup>                             | 99953-16 <sup>e</sup><br>99954-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 52621-16 <sup>k</sup><br>95650-16 <sup>l</sup> | 52975-1 <sup>m</sup>           |                   | 27774-16 <sup>n</sup>               | 27750-16 <sup>o</sup><br>27771-16 <sup>p</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99956-16 <sup>e</sup><br>99970-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 52621-16 <sup>k</sup><br>95650-16 <sup>l</sup> | 52975-1 <sup>m</sup>           |                   | 27774-16 <sup>n</sup>               | 27750-16 <sup>o</sup><br>27771-16 <sup>p</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99956-16 <sup>e</sup><br>99970-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 52621-16 <sup>k</sup><br>95650-16 <sup>l</sup> | 52975-1 <sup>m</sup>           |                   | 27774-16 <sup>n</sup>               | 27750-16 <sup>o</sup><br>27771-16 <sup>p</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99956-16 <sup>e</sup><br>99970-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 52621-16 <sup>k</sup><br>95650-16 <sup>l</sup> | 52975-1 <sup>m</sup>           |                   | 27774-16 <sup>n</sup>               | 27750-16 <sup>o</sup><br>27771-16 <sup>p</sup> |
|                                | 99885-16 <sup>c</sup>                             | 99956-16 <sup>e</sup><br>99970-16 <sup>f</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 52621-16 <sup>k</sup><br>95650-16 <sup>l</sup> | 52975-1 <sup>m</sup>           |                   | 27774-16 <sup>n</sup>               | 27750-16 <sup>o</sup><br>27771-16 <sup>p</sup> |
|                                | 96888-16 <sup>c</sup><br>961226-16 <sup>c,d</sup> | 99681-16 <sup>g</sup><br>99661-16 <sup>g</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup>                         | 52621-16 <sup>k</sup><br>95650-16 <sup>l</sup> | 52975-1 <sup>m</sup>           |                   |                                     | 27750-16 <sup>o</sup><br>27771-16 <sup>p</sup> |
|                                | 96888-16 <sup>c</sup><br>961226-16 <sup>c,d</sup> | 99681-16 <sup>g</sup><br>99661-16 <sup>g</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>i</sup>                         | 52621-16 <sup>k</sup><br>95650-16 <sup>l</sup> | 52975-1 <sup>m</sup>           |                   |                                     | 27750-16 <sup>o</sup><br>27771-16 <sup>p</sup> |

- a Requires 52970-1 (.500" I.D.) or 52971-1 (.531" I.D.) steel, or 52990-1 (.500" I.D.) or 52989-1 (.531" I.D.) aluminum-bronze distributor drive gear.
- b Ultra Pro Series roller lifters.
- c Must machine cylinder heads.
- d For 2.100" assembly height, requires 99661-16 titanium retainers.
- e 11/32" type, see **IMPORTANT NOTE** and page 195 for correct application.
- f 3/8" type, see **IMPORTANT NOTE** and page 195 for correct application.
- g Titanium 11/32" type, must use 99097-1 valve stem locks, included with the retainers, see **IMPORTANT NOTE** for correct application.
- h Titanium, for 961226-16 valve springs, requires Crane Multi Fit valve stem locks.
- i Machined steel, heat treated 11/32" single groove type, see **IMPORTANT NOTE** for correct application.
- j Machined steel, heat treated Multi Fit 11/32" single groove type, see **IMPORTANT NOTE** for correct application.
- k For 70-74 351C, heavy wall, heat treated, for use with pushrod guideplate cylinder heads.
- l For 71-72 Boss 351, for use with or without pushrod guideplate cylinder heads.
- m Performance steel billet gears and roller chain set.
- n Crane Classic extruded, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.
- o 1.73 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.
- p 1.73 ratio Wide Body, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page.

### COMPLETE CAM SPECIFICATIONS

See pg. 286

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code  | FOLLOWERS | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Valve Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|---|-----------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Follower Camshafts</b>   |                                  |                       |   |           |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, good idle, daily usage, off road, mild supercharged, mild nitrous, 2200-2600 cruise RPM.   | <b>HR-218/500-2-16</b>           | 2000-5000             | <b>379501<sup>a</sup></b>   |           | 218<br>228                                 | 254<br>264                                    | 116                           | (2) 40<br>55 (7)                               | .000<br>.000                | .500<br>.500                  |
|  |                                  |                       |    |           |  |   |                               |  |                             |                               |
| Good mid range torque and HP, fair idle, performance usage, bracket racing, computer upgrades required, 2600-3000 cruise RPM.  | <b>HR-228/500-2S-12</b>          | 2400-6200             | <b>379511<sup>a</sup></b>   |           | 228<br>234                                 | 264<br>270                                    | 112                           | 7 41<br>54 0                                   | .000<br>.000                | .500<br>.500                  |
|  |                                  |                       |    |           |  |   |                               |  |                             |                               |
| Excellent low end torque and HP, smooth idle, daily usage, towing, 1600-2200 cruise RPM.   | <b>HR-212/550-2S-15</b>          | 1600-5500             | <b>379601<sup>b</sup></b>   |           | 212<br>218                                 | 248<br>254                                    | 115                           | (4) 36<br>49 (11)                              | .000<br>.000                | .550<br>.550                  |
|  |                                  |                       |    |           |  |   |                               |  |                             |                               |
| Good low end and mid range torque and HP, good idle, daily usage, off road, mild supercharged, mild nitrous, 2200-2600 cruise RPM.   | <b>HR-218/550-2-16</b>           | 2000-5800             | <b>379611<sup>b</sup></b>   |           | 218<br>228                                 | 254<br>264                                    | 116                           | (2) 40<br>55 7                                 | .000<br>.000                | .550<br>.550                  |
|  |                                  |                       |    |           |  |   |                               |  |                             |                               |
| Good mid range torque and HP, fair idle, performance usage, bracket racing, auto w/2000+ converter, computer upgrades required, must check valve to piston clearance, 2600-3000 cruise RPM.  | <b>HR-228/550-2S-12</b>          | 2400-6200             | <b>379621<sup>b</sup></b>   |           | 228<br>234                                 | 264<br>270                                    | 112                           | 7 41<br>54 0                                   | .000<br>.000                | .550<br>.550                  |
|  |                                  |                       |    |           |  |   |                               |  |                             |                               |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, bracket racing, auto w/2500+ converter, increased compression ratio required, computer upgrades required, must check valve to piston clearance, 2800-3400 cruise RPM. Also mild supercharged or nitrous. | <b>HR-236/600-2S-14</b>          | 2800-6600             | <b>379631<sup>b</sup></b>   |           | 236<br>242                                 | 272<br>278                                    | 114                           | 6 50<br>57 5                                   | .000<br>.000                | .600<br>.600                  |
|  |                                  |                       |  |           |  |   |                               |  |                             |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**NOTE:** Installing camshafts having greater than .500" valve lift in other than Performance Improvement 2V cylinder heads will require cylinder head machining to achieve correct valve spring assembly heights.

**IMPORTANT NOTE:** 1997 and later applications will require Ford bolt-on gears: Ford part number F8AZ-6256-AA for the right gear, and F8AZ-6256-BA for the left gear. One of the YF7Z-6279-AA bolt kits, two F1AZ-6278-A washers, and two F3AZ-6265-A spacers will also be required.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>          | <i>See pg. 350</i>          | <i>See pg. 362</i> | <i>See pg. 360</i> | <i>See pg. 306</i> | <i>See pg. 328</i>             | <i>See pg. 312</i> | <i>See pg. 315</i>                                  | <i>See pg. 317</i> |
|--------------------------------|-----------------------------|-----------------------------|--------------------|--------------------|--------------------|--------------------------------|--------------------|---|--------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS               | RETAINERS                   | VALVE STEM SEALS   | VALVE STEM LOCKS   | PUSHRODS           | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE          |
|                                | <b>37830-16<sup>c</sup></b> | <b>37660-16<sup>d</sup></b> |                    |                    |                    |                                |                    |   |                    |
|                                | <b>37830-16<sup>c</sup></b> | <b>37660-16<sup>d</sup></b> |                    |                    |                    |                                |                    |   |                    |
|                                | <b>37830-16<sup>c</sup></b> | <b>37660-16<sup>d</sup></b> |                    |                    |                    |                                |                    |   |                    |
|                                | <b>37830-16<sup>c</sup></b> | <b>37660-16<sup>d</sup></b> |                    |                    |                    |                                |                    |   |                    |
|                                | <b>37830-16<sup>c</sup></b> | <b>37660-16<sup>d</sup></b> |                    |                    |                    |                                |                    |   |                    |
|                                | <b>37830-16<sup>c</sup></b> | <b>37660-16<sup>d</sup></b> |                    |                    |                    |                                |                    |   |                    |

- a** Pair of camshafts for 1992 and later engines with standard cylinder heads. 1997 and later applications will require Ford bolt-on gears: Ford part number F8AZ-6256-AA for the right gear, and F8AZ-6256-BA for the left gear.
- b** Pair of camshafts for 1999 and later engines with Power Improvement cylinder heads. Requires Ford bolt-on gears: Ford part number F8AZ-6256-AA for the right gear, and F8AZ-6256-BA for the left gear.

- c** Standard diameter ovate wire valve springs, no machining required. Can be used with stock valve spring retainers.
- d** Titanium retainers, for use with standard valve stem locks.

# Ford-Mercury V-8 93-10

4.6-5.4 Litre DOHC 4 Valve

## COMPLETE CAM SPECIFICATIONS

See pg. 286

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | FOLLOWERS | Degrees<br>Duration<br>@ .050" | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050" | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------|--------------------------------|---|-------------------------------|-----------------------|---------------------|-------------------------------|
| <b>Hydraulic Roller Follower Camshafts</b>  |                                  |                       |  |           |                                |   |                               |                       |                     |                               |
| Good low end and mid range torque and HP, good idle, daily usage, off road, computer upgrades required, mild supercharged, mild nitrous, 2200-2600 cruise RPM.  | HR-218/500-12                    | 2000-<br>5800         | 409501 <sup>a,e</sup>                      | 3         | 218                            | 254   | 112                           | (3) 41                | .000                | .500                          |
|   |                                  |                       | 409502 <sup>b,e</sup>                      |           | 218                            | 254   | 41 (3)                        | .000                  | .500                |                               |
|   |                                  |                       | 409503 <sup>c,e</sup>                      |           |                                |   |                               |                       |                     |                               |
|   |                                  |                       | 409504 <sup>d,e</sup>                      |           |                                |   |                               |                       |                     |                               |
| Good low end and mid range torque and HP, good idle, daily usage, off road, computer upgrades required, mild supercharged, mild nitrous, 2600-3000 cruise RPM.  | HR-228/500-12                    | 2400-<br>6200         | 409511 <sup>a,e</sup>                      | 3         | 228                            | 264   | 112                           | 2 46                  | .000                | .500                          |
|   |                                  |                       | 409512 <sup>b,e</sup>                      |           | 228                            | 264   | 46 2                          | .000                  | .500                |                               |
|   |                                  |                       | 409513 <sup>c,e</sup>                      |           |                                |   |                               |                       |                     |                               |
|   |                                  |                       | 409514 <sup>d,e</sup>                      |           |                                |   |                               |                       |                     |                               |
| Good mid range to upper RPM torque and HP, rough idle, performance usage, bracket racing, auto w/2500+ converter, increased compression ratio required, computer upgrades required, must check valve to piston clearance, 2800-3400 cruise RPM. Also mild supercharged or nitrous.          | HR-234/500-12                    | 2800-<br>6600         | 409521 <sup>a,e</sup>                      | 3         | 234                            | 270   | 112                           | 5 49                  | .000                | .500                          |
|   |                                  |                       | 409522 <sup>b,e</sup>                      |           | 234                            | 270   | 49 5                          | .000                  | .500                |                               |
|   |                                  |                       | 409523 <sup>c,e</sup>                      |           |                                |   |                               |                       |                     |                               |
|   |                                  |                       | 409524 <sup>d,e</sup>                      |           |                                |   |                               |                       |                     |                               |
| Good mid range torque and HP for 5.7L, good idle, performance usage, off road, computer upgrades required, mild supercharged, mild nitrous, 2600-3200 cruise RPM.   | HR-230/575-12                    | 2400-<br>6200         | 409601 <sup>a,e,f</sup>                    | 3         | 230                            | 266   | 112                           | 3 47                  | .000                | .575                          |
|   |                                  |                       | 409602 <sup>b,e,f</sup>                    |           |                                |   |                               |                       |                     |                               |
| Good mid range to upper RPM torque and HP for 5.7L, rough idle, performance usage, bracket racing, auto w/2500+ converter, increased compression ratio required, computer upgrades required, must check valve to piston clearance, 2800-3400 cruise RPM. Also mild supercharged or nitrous. | HR-234/575-12                    | 2800-<br>6600         | 409611 <sup>a,e,f</sup>                    | 3         | 234                            | 270   | 112                           | 7 49                  | .000                | .575                          |
|   |                                  |                       | 409612 <sup>b,e,f</sup>                    |           |                                |   |                               |                       |                     |                               |
| Good upper RPM torque and HP for 5.7L, rough idle, performance usage, bracket racing, auto w/2800+ converter, increased compression ratio required, computer upgrades required, must check valve to piston clearance, 3000-3600 cruise RPM. Also mild supercharged or nitrous.              | HR-238/575-12                    | 3200-<br>6800         | 409621 <sup>a,e,f</sup>                    | 3         | 238                            | 274   | 112                           | 7 51                  | .000                | .575                          |
|   |                                  |                       | 409622 <sup>b,e,f</sup>                    |           |                                |   |                               |                       |                     |                               |

CAMSHAFTS

# Ford-Mercury V-8 05-10

4.6-5.4 Litre SOHC 3 Valve

## Hydraulic Roller Follower Camshafts

|  |                   |               |                     |   |     |     |        |        |      |      |
|--|-------------------|---------------|---------------------|---|-----|-----|--------|--------|------|------|
| Good low end and mid range torque and HP, smooth idle, daily usage, 5.4L towing, 2200-2600 cruise RPM, valve spring upgrades required. Also mild supercharged or mild nitrous.                                       | ZHR-208/468-2S-14 | 1800-<br>5000 | 399501 <sup>j</sup> | 3 | 204 | 256 | 114    | (5) 33 | .000 | .468 |
|  |                   |               |                     |   | 224 | 272 | 51 (7) | .000   | .516 |      |
| Good mid range torque and HP, good idle, performance usage, bracket racing, good w/supercharger or mild nitrous, 2600-3000 cruise RPM, valve spring and computer upgrades required.                                  | ZHR-216/492-2S-14 | 2200-<br>5400 | 399511 <sup>k</sup> | 3 | 216 | 264 | 114    | (1) 37 | .000 | .492 |
|  |                   |               |                     |   | 236 | 284 | 57 (1) | .000   | .552 |      |
| Good mid to upper RPM torque and HP, fair idle, performance usage, bracket racing, auto trans w/2000+ converter, 11.0+ compression ratio advised, 3000-3600 cruise RPM, valve spring and computer upgrades required. | ZHR-228/528-2S-12 | 2600-<br>6200 | 399521 <sup>k</sup> | 3 | 228 | 276 | 112    | 7 41   | .000 | .528 |
|  |                   |               |                     |   | 244 | 292 | 59 5   | .000   | .576 |      |
| Good upper RPM HP, rough idle, performance usage, bracket racing, auto trans w/2500+ converter, 11.0+ compression ratio advised, 3200-3800 cruise RPM, valve spring and computer upgrades required.                  | ZHR-236/552-2S-12 | 2800-<br>6600 | 399531 <sup>k</sup> | 3 | 236 | 284 | 112    | 11 45  | .000 | .552 |
|  |                   |               |                     |   | 252 | 300 | 63 9   | .000   | .600 |      |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT NOTE:** The 4V high lift (.575") intake camshafts listed are for use in 4.7 or 5.4L cylinder heads that have aftermarket intake valves with relocated valve lock grooves (with the valve tip extending 10.65mm above the groove). This permits the necessary assembly height required, without follower interference.

**IMPORTANT NOTE:** In 3V applications, the use of stock pistons, cam phaser, and factory tuning can cause possible exhaust valve to piston contact when using performance camshafts. One, or more, of the following changes must occur: Install a fixed position cam gear that eliminates phaser retard; Install aftermarket pistons with increased piston to valve clearances; Install aftermarket tuning with altered phaser strategy.

**NOTE:** When changing 3-valve camshafts, use Ford timing chain and wedge handle ESST 303-636 and ESST 303-637 to hold chain in place. When changing valve springs, use Ford valve spring compressor ESST 303-1039.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350           | See pg. 362      | See pg. 360      | See pg. 306 | See pg. 328                    | See pg. 312       | See pg. 315   | See pg. 317 |
|--------------------------------|-----------------------|-----------------------|------------------|------------------|-------------|--------------------------------|-------------------|---|-------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS             | VALVE STEM SEALS | VALVE STEM LOCKS | PUSHRODS    | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE   |
|                                | 40830-32 <sup>g</sup> | 40660-32 <sup>i</sup> |                  |                  |             |                                |                   |   |             |
|                                | 40830-32 <sup>g</sup> | 40660-32 <sup>i</sup> |                  |                  |             |                                |                   |   |             |
|                                | 40830-32 <sup>g</sup> | 40660-32 <sup>i</sup> |                  |                  |             |                                |                   |   |             |
|                                | 37830-16 <sup>h</sup> | 37660-16 <sup>i</sup> |                  |                  |             |                                |                   |   |             |
|                                | 37830-16 <sup>h</sup> | 37660-16 <sup>i</sup> |                  |                  |             |                                |                   |   |             |
|                                | 37830-16 <sup>h</sup> | 37660-16 <sup>i</sup> |                  |                  |             |                                |                   |   |             |
|                                | 37830-24 <sup>l</sup> | 39660-24 <sup>m</sup> |                  |                  |             |                                |                   |   |             |
|                                | 37830-24 <sup>l</sup> | 39660-24 <sup>m</sup> |                  |                  |             |                                |                   |   |             |
|                                | 37830-24 <sup>l</sup> | 39660-24 <sup>m</sup> |                  |                  |             |                                |                   |   |             |
|                                | 37830-24 <sup>l</sup> | 39660-24 <sup>m</sup> |                  |                  |             |                                |                   |   |             |

- a Left intake camshaft.
- b Right intake camshaft.
- c Left exhaust camshaft.
- d Right exhaust camshaft.
- e Install adjustable cam gears for best performance. Install aftermarket tuning to achieve desired performance levels.
- f Intake valves with relocated keeper grooves must be installed, along with recommended valve springs and retainers.
- g Standard diameter ovate wire valve springs, requires 40660-32 retainers.
- h Standard diameter ovate wire valve springs, requires 37660-16 retainers.
- i Titanium retainers, for use with standard valve stem locks.
- j Must install 37830-24 valve springs and 39660-24 valve spring retainers.
- k The use of stock pistons, cam phaser, and factory tuning can cause possible exhaust valve to piston contact. At least one of the following is necessary: Install a fixed position cam gear that eliminates phaser retard; Install aftermarket pistons with increased piston to valve clearance; Install aftermarket tuning with altered phaser strategy.
- l Standard diameter ovate wire valve springs, requires 37660-24 retainers.
- m Titanium retainers, for use with standard valve stem locks.

# Ford Big Block V8 Tech Tips & Notes

## 1963-1976 352-360-390-406-410-427-428 FE V8

Ford's legendary big block FE engine series provided the foundation for their passenger car, truck and performance applications for nearly two decades. Actually, this series was introduced in 1958, with the early 332-352-390 FE engines having a different camshaft and cam drive configuration than the 1963-1976 engines, preventing their direct interchangeability. The early engines did not have a camshaft thrustplate, but relied on a spring to control cam endplay. These engines can use the later camshafts if the thrustplate is installed by removing the plugs in the front of the block on either side of the cam thrust surface, and tapping the holes for the 5/16-18 attaching bolts. A later model timing chain and gear set will also have to be installed.

There were also FT engines, used in truck applications. These were basically the same powerplants as the FE, but with four-ring pistons installed.

For marine usage, some left hand rotation engines were produced, requiring a special camshaft and distributor drive gear.

Crane's 34 prefix designates this engine series, with a full line of camshafts and valve train components available. Hydraulic, retrofit hydraulic roller, mechanical, and mechanical roller camshafts are offered.

Do not confuse the FE with the MEL engine family that Ford offered from 1958 to 1968 (383-410-430-462 cu.in.). Note that a 410 cu.in. engine was also included in that series. About the only common parts between the two engine families were the lifters and the rocker arms.

FE engines were factory equipped with either hydraulic and mechanical lifter camshafts from the factory, depending upon horsepower requirements. The factory adjustable shaft mounted rocker arms have a 1.76:1 ratio, while the non-adjustable rockers have a 1.73:1 ratio. Lifter bores are inline, as are the valves in the cylinder heads.

Oiling for the top end of the engine is directed up through passages in the block and heads, through the rocker shaft stands and shafts, then out via holes on the rocker arms.

Watch for the 1965-1967 side-oiler 427 engines (and some rare 390 versions) specifically designed for mechanical lifter only usage. These blocks do not have oil galleys to supply hydraulic lifters. Therefore, hydraulic and hydraulic roller camshafts and lifters can not be used. The camshafts used in these blocks also require grooves in the second and fourth cam bearing journals (.044" wide and .035" deep, with a .022" radius) for proper oiling.

Cylinder head configurations ranged from the basic low-rise, the drag race and oval track oriented high-rise, a medium-rise, and the tunnel port. All employed the same valve layout, so no camshaft changes were required. The rocker arm shaft stands varied per version, although the low-riser and the tunnel port did share the same components.

A thriving aftermarket provides sufficient components to

build an FE from scratch. We plan on supplying camshaft and valve train components for well into the future for this icon of Ford performance.

## 1963-1965 427 SOHC V8

Developed for oval track and drag racing, the single overhead cam 427 V8 was a real show of engineering force from Ford. Although this engine was banned from use at the big ovals, drag racing certainly benefited from this escalation of factory technology. Crane was fortunate to be involved in camshaft design for these engines from the beginning, and continues to custom produce camshafts for The "cammer". We also offer valve springs, retainers, and valve locks. Our 32-prefix designates these camshafts.

Based on a variant of the 427 FE side oiler block, the iron cylinder heads incorporate one camshaft per bank, actuating valves in a hemispherical combustion chamber via shaft mounted mechanical roller followers, which have an effective 1.32:1 ratio. Valve lash adjustments are achieved by installing varying thickness lash caps on top of the valves. Single and dual four barrel carbureted versions were factory produced. There were a limited number of aluminum cylinder heads produced for the factory supported racers, but these did not come installed on any engines.

Although never officially "factory" installed in any vehicles, connected outside contractors did obtain complete engines, and put them into Mustangs, Fairlanes, and Galaxies for sale to the racing community.

This engine is also experiencing a rebirth by the aftermarket, with numerous components being offered. Expect more reproduction parts to be available in the next year.

## 1968-1997 370-429-460 (7.5L) V8

The final Ford big block family is the 385 series. Replacing the FE, newer casting techniques were used, along with more efficient cylinder heads, and a lighter valve train.

Crane's 35 prefix indicates parts specific to these engines. Hydraulic, retrofit hydraulic roller, mechanical, and mechanical roller camshafts and a full line of valve train components are offered.

The lifter bores in the block are inline, but the valves are staggered in the cylinder heads for better breathing and combustion. The standard 1.73:1 ratio rocker arms are stamped steel and either stud mounted (1968-1971) or pedestal mounted (1972-1997). The rocker arms were primarily non-adjustable, with a few exceptions. The 1970-1971 Cobra Jet 429 engines had adjustable rocker arms and pushrod guideplates, while the 1970-1971 Super Cobra Jet 429's came equipped with mechanical lifter camshafts and adjustable rocker arms and guideplates.

Oiling for the top end of the engine is conducted through the lifters and pushrods, providing lubrication for the rocker arm pivots and valve springs.

The 1968-1971 engines are equipped with bottleneck configuration rocker arm studs. Our **99768-16** positive locking

nuts can be installed to permit individual valve adjustment. To conveniently convert the non-adjustable pedestal mounted rocker arm cylinder heads to a fully adjustable configuration, Crane offers two Pushrod Guideplate and Rocker Arm Stud conversion kits. Part number **52655-16** enables the installation of 7/16" stud mounted rocker arms and 5/16" diameter pushrods, while part number **35655-16** is for 7/16" stud mounted rocker arms and 3/8" diameter pushrods. Either set installs on the cylinder heads with no machining required, and are suitable for most street and moderate performance applications. For racing, we advise that the heads be machined for our **99159-16** 7/16" diameter studs, and heat treated pushrod guideplates. There are also a number of aftermarket cylinder heads available that already include studs and guideplates, permitting full adjustment.

For serious racing applications, we offer 8620 steel billet camshafts with either the standard firing order (1-5-4-2-6-3-7-8), or the SFO1 firing order (1-5-4-8-6-3-7-2).

### 1969-1970 429 Boss Hemi V8

Available only in the Boss 429 Mustang and the Torino Talladega, this rare variation of the 385 series has a number of unique features. Although quite similar to the standard blocks, the Boss has a dry deck surface, requiring individual sealing rings at the cylinder head interface in order to properly seal around each cylinder, and also around each oil and water passage. The other feature of the Boss block is the oiling system, with oiling to the top end coming up through passages in the block, cylinder heads, and rocker arm shafts, not up the pushrods.

Crane's 30 prefix indicates parts specific to these engines. Hydraulic, retrofit hydraulic roller, mechanical, and mechanical roller camshafts and a full line of valve train components are offered. Even though the camshaft is interchangeable with the 385 series engines, the different rocker arm ratios and valve spring requirements necessitate a different specification card.

The "semi-hemi" cylinder heads are aluminum, and offered in oval track and street versions. The oval track heads had 1.75:1 ratio intake and exhaust rocker arms, with smaller diameter rocker shafts than the street version, which was equipped with 1.65:1 intake and 1.75:1 exhaust rocker arms. Different length pushrods are required for the intake and exhaust valves. Specific hydraulic and mechanical roller lifters are also required for proper pushrod clearance, due to the different angular displacement of the intake and exhaust pushrods.

For serious racing applications, we offer 8620 steel billet camshafts with either the standard firing order (1-5-4-2-6-3-7-8), or the SFO1 firing order (1-5-4-8-6-3-7-2).

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number   | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code   | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|---|------------------------------------|-----------------------|--|--|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>   |                                    |                       |  |  |  |   |                               |  |                     |                               |
| Brute low end torque, F-150 pickup, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.   | <b>H-248-2</b>                     | 800-4200              | <b>343971*</b>                               | <b>99281-16</b>                                | 192<br>204                                 | 248<br>260                                    | 114                           | (13) 25<br>41 (17)                           | .000<br>.000        | .469<br>.501                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |
| Good low end torque, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.   | <b>H-260-2</b>                     | 1200-4800             | <b>343901*</b><br><b>343902*<sup>a</sup></b> | <b>99281-16</b>                                | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000        | .501<br>.533                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |
| Good low and mid range torque, smooth idle, daily usage, light towing, off road, 2200-2700 cruise RPM, 8.5 to 10.0 compression ratio advised.   | <b>Energizer<br/>266 H10</b>       | 1400-4800             | <b>13404*</b><br><b>134042*<sup>a</sup></b>  | <b>99281-16</b>                                | 210<br>210                                 | 266<br>266                                    | 110                           | 0 30<br>40 (10)                              | .000<br>.000        | .516<br>.516                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |
| Good mid range torque, good idle, daily usage, off road, highway towing, fuel efficiency plus performance, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.  | <b>Energizer<br/>272 H10</b>       | 1800-5200             | <b>13405*</b><br><b>134052*<sup>a</sup></b>  | <b>99281-16</b>                                | 216<br>216                                 | 272<br>272                                    | 110                           | 3 33<br>43 (7)                               | .000<br>.000        | .533<br>.533                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |
| Good low and mid-range torque, good idle, daily usage and off road, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.75 compression ratio advised.   | <b>H-272-2</b>                     | 1800-5200             | <b>343941*</b><br><b>343942*<sup>a</sup></b> | <b>99281-16</b>                                | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000        | .533<br>.563                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |
| Replacement for over-the-counter Ford Factory Performance camshaft (also referred to as SK-39789)   | <b>BluePrinted<br/>C8AX-6250-C</b> | 1800-5200             | <b>340301</b>                                | <b>99281-16</b>                                | 220<br>230                                 | 278<br>290                                    | 116                           | (1) 41<br>56 (6)                             | .000<br>.000        | .498<br>.498                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |
| Good mid-range torque, good idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.   | <b>H-278-2</b>                     | 2000-5400             | <b>343801*</b><br><b>343802*<sup>a</sup></b> | <b>99281-16</b><br><b>99381-16<sup>b</sup></b> | 222<br>234                                 | 278<br>290                                    | 114                           | 2 40<br>56 (2)                               | .000<br>.000        | .548<br>.580                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |
| Good mid-range torque and HP, fair idle, moderate performance usage, bracket racing, 3200-3600 cruise RPM, 9.5 to 11.0 compression ratio advised.   | <b>H-288</b>                       | 2200-5600             | <b>344341*</b><br><b>344342*<sup>a</sup></b> | <b>99281-16</b><br><b>99381-16<sup>b</sup></b> | 226<br>226                                 | 288<br>288                                    | 112                           | 6 40<br>50 (4)                               | .000<br>.000        | .537<br>.537                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |
| Fair idle, performance usage, good mid-range HP, 3800-4200 cruise RPM, 10.0 to 11.5 compression ratio advised.  | <b>H-296-2</b>                     | 2800-6200             | <b>344621*</b>                               | <b>99281-16</b><br><b>99381-16<sup>b</sup></b> | 234<br>238                                 | 296<br>300                                    | 112                           | 10 44<br>56 2                                | .000<br>.000        | .554<br>.563                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |
| Rough idle, performance usage, good mid-range and upper RPM torque and HP, auto trans w/2500+ converter, good with aftermarket aluminum cylinder heads, 3600-4000 cruise RPM, 10.0 to 11.5 compression ratio advised. | <b>H-298</b>                       | 3000-6500             | <b>344561*</b>                               | <b>99281-16</b><br><b>99381-16<sup>b</sup></b> | 236<br>236                                 | 298<br>298                                    | 108                           | 15 41<br>51 5                                | .000<br>.000        | .572<br>.572                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |
| Performance usage, good upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, good with aftermarket aluminum cylinder heads, 10.5 to 12.0 compression ratio advised.                                 | <b>H-246/330-10</b>                | 3400-6800             | <b>340721*</b>                               | <b>99281-16</b><br><b>99381-16<sup>b</sup></b> | 246<br>246                                 | 308<br>308                                    | 110                           | 18 48<br>58 8                                | .000<br>.000        | .581<br>.581                  |
|   |                                    |                       | ❖  |  |  |   |                               |  |                     |                               |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Specify if late 62-406 cu.in. or 63-76 block is used, as the cam is different than the one used in 58-62 block.

**NOTE:** All grinds shown use the stock Ford 1.76 ratio adjustable rocker arms - Ford part number B8A-6564-B or Crane adjustable ductile iron rocker arms, **34772-16**, in order to achieve the listed gross valve lift figures.

**NOTE:** To provide the most accurate valve adjustment on hydraulic lifter camshafts, the use of Crane adjustable rocker arms (**34772-16** or **34791-1**) and appropriate pushrods (**34621-16** or **95819-16**) is highly recommended.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Some cylinder heads have removable lower spring seats with an inner spring step. This step must be removed to allow the inner springs to set flush with the outer springs.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360          | See pg. 306                                    | See pg. 328                    | See pg. 312           | See pg. 315   | See pg. 321          |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|----------------------|--|--------------------------------|-----------------------|---|----------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | CAST ROCKER ARMS      | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER      GOLD<br>RACE |                      |
| 13309-1 <sup>c</sup>           | 96801-16 <sup>c</sup> | 99957-16<br>99969-16 <sup>e</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>f</sup> | 34621-16 <sup>g</sup><br>95819-16 <sup>h</sup> |                                | 34772-16 <sup>i</sup> |   | 34791-1 <sup>j</sup> |
| 13309-1 <sup>c</sup>           | 96801-16 <sup>c</sup> | 99957-16<br>99969-16 <sup>e</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>f</sup> | 34621-16 <sup>g</sup><br>95819-16 <sup>h</sup> |                                | 34772-16 <sup>i</sup> |   | 34791-1 <sup>j</sup> |
| 13309-1 <sup>c</sup>           | 96801-16 <sup>c</sup> | 99957-16<br>99969-16 <sup>e</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>f</sup> | 34621-16 <sup>g</sup><br>95819-16 <sup>h</sup> |                                | 34772-16 <sup>i</sup> |   | 34791-1 <sup>j</sup> |
| 13309-1 <sup>c</sup>           | 96801-16 <sup>c</sup> | 99957-16<br>99969-16 <sup>e</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>f</sup> | 34621-16 <sup>g</sup><br>95819-16 <sup>h</sup> |                                | 34772-16 <sup>i</sup> |   | 34791-1 <sup>j</sup> |
| 13309-1 <sup>c</sup>           | 96801-16 <sup>c</sup> | 99957-16<br>99969-16 <sup>e</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>f</sup> | 34621-16 <sup>g</sup><br>95819-16 <sup>h</sup> |                                | 34772-16 <sup>i</sup> |   | 34791-1 <sup>j</sup> |
| 13309-1 <sup>c</sup>           | 96801-16 <sup>c</sup> | 99957-16<br>99969-16 <sup>e</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>f</sup> | 34621-16 <sup>g</sup><br>95819-16 <sup>h</sup> |                                | 34772-16 <sup>i</sup> |   | 34791-1 <sup>j</sup> |
| 13309-1 <sup>c</sup>           | 96801-16 <sup>c</sup> | 99957-16<br>99969-16 <sup>e</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>f</sup> | 34621-16 <sup>g</sup><br>95819-16 <sup>h</sup> |                                | 34772-16 <sup>i</sup> |   | 34791-1 <sup>j</sup> |
|                                | 96877-16 <sup>d</sup> | 99969-16 <sup>e</sup>             | 99822-16 <sup>d</sup> | 99098-1 <sup>f</sup> | 34621-16 <sup>g</sup><br>95819-16 <sup>h</sup> |                                | 34772-16 <sup>i</sup> |   | 34791-1 <sup>j</sup> |
|                                | 96877-16 <sup>d</sup> | 99969-16 <sup>e</sup>             | 99822-16 <sup>d</sup> | 99098-1 <sup>f</sup> | 34621-16 <sup>g</sup><br>95819-16 <sup>h</sup> |                                | 34772-16 <sup>i</sup> |   | 34791-1 <sup>j</sup> |
|                                | 96877-16 <sup>d</sup> | 99969-16 <sup>e</sup>             | 99822-16 <sup>d</sup> | 99098-1 <sup>f</sup> | 34621-16 <sup>g</sup><br>95819-16 <sup>h</sup> |                                | 34772-16 <sup>i</sup> |   | 34791-1 <sup>j</sup> |

- a Cam and Lifter Kit, includes installation lubricants.
- b Optional Hi Intensity hydraulic lifters, see page 292 for details.
- c Standard diameter valve springs, no machining required.
- d Must machine cylinder heads.
- e Requires 99098-1 valve locks.
- f Machined steel, heat treated.

- g Heavy wall, heat treated, for use with 34772-16 adjustable rocker arms with ball type adjusters.
- h Pro Series one-piece, for use with 34791-1 adjustable rocker arms with cup type adjusters.
- i 1.76 ratio, ductile iron, adjustable, requires appropriate 34645-16 Crane pushrods.
- j 1.76 ratio, complete with shafts, stands, and hardware. For low rise and Edelbrock cylinder heads, requires appropriate 95819-16 Crane pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application  | Camshaft Series/<br>Grind Number    | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|-------------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts — Retrofit</b>   |                                     |                       |  |  |  |   |                               |  |                             |                               |
| Good low end torque, smooth idle, daily usage, towing, economy, also mild turbocharged, 2200-3000 cruise RPM, 8.0 to 9.5 compression ratio advised.  | <b>HR-214/319-2S-12</b>             | 1400-5400             | <b>349511<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b>                    | 214<br>222                                 | 276<br>284                                    | 112                           | 0 34<br>48 (6)                               | .000<br>.000                | .561<br>.584                  |
|  |                                     |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Excellent low and mid-range torque and HP, good idle, moderate performance usage, mild bracket racing, 2800-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.   | <b>HR-222/320-2S1-12</b>            | 1800-5600             | <b>349551<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b>                    | 222<br>226                                 | 286<br>290                                    | 112                           | 3 39<br>49 (3)                               | .000<br>.000                | .563<br>.563                  |
|  |                                     |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Excellent low and mid-range torque and HP, fair idle, moderate performance usage, mild bracket racing, 3000-3600 cruise RPM, good with aftermarket aluminum cylinder heads, 10.0 to 11.5 compression ratio advised.  | <b>HR-226/3201-2S-12</b>            | 2000-5800             | <b>349561<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b>                    | 226<br>236                                 | 290<br>302                                    | 112                           | 5 41<br>54 2                                 | .000<br>.000                | .563<br>.581                  |
|  |                                     |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Excellent mid-range & upper RPM HP, lightweight kit car, rough idle, performance usage, good mid-range HP, mild bracket racing, auto trans w/2500+ converter, works well with aftermarket aluminum cylinder heads, 3600-4200 cruise RPM, 10.5 to 12.0 compression ratio advised. | <b>HR-234/354-2S-12</b>             | 2400-6200             | <b>349571<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b>                    | 234<br>242                                 | 298<br>306                                    | 112                           | 9 45<br>57 5                                 | .000<br>.000                | .623<br>.651                  |
|  |                                     |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Good mid-range and upper RPM HP, lightweight kit car, rough idle, performance usage, mild bracket racing, auto trans w/3000+ converter, good with 450+ cu.in., good with aftermarket aluminum cylinder heads, 3800-4400 cruise RPM, 11.0 to 13.0 compression ratio advised.      | <b>HR-242/350-2S-12</b>             | 2800-6400             | <b>349581<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b>                    | 242<br>248                                 | 308<br>312                                    | 112                           | 13 49<br>60 8                                | .000<br>.000                | .616<br>.616                  |
|  |                                     |                       | ⚡  |  |  |   |                               |  |                             |                               |
| <b>Mechanical Lifter Camshafts</b>   |                                     |                       |  |  |  |   |                               |  |                             |                               |
| Good mid range torque, fair idle, moderate performance usage, good low and mid-range HP, off road, bracket racing, 3400-3800 cruise RPM, mild supercharged, 10.0 to 11.5 compression ratio advised.  | <b>F-238/3200-2-14</b>              | 2400-6000             | <b>341191<sup>*</sup></b>                  | <b>99257-16</b><br><b>99256-16<sup>c</sup></b> | 238<br>248                                 | 300<br>310                                    | 114                           | 10 48<br>63 5                                | .026<br>.026                | .563<br>.584                  |
|  |                                     |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Replacement for factory 425 HP, 427 cu.in. camshaft.   | <b>BluePrinted<br/>C3AZ-6250-AA</b> | 3000-6600             | <b>340321<sup>*</sup></b>                  | <b>99257-16</b><br><b>99256-16<sup>c</sup></b> | 244<br>244                                 | 284<br>284                                    | 114                           | 13 51<br>61 3                                | .018<br>.022                | .524<br>.524                  |
|  |                                     |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Good mid range torque and HP, rough idle, moderate performance usage, good mid-range HP, 3600-4200 cruise RPM, 10.5 to 12.0 compression ratio advised.   | <b>F-248/3334-12</b>                | 3400-7000             | <b>340471<sup>*</sup></b>                  | <b>99257-16</b><br><b>99256-16<sup>c</sup></b> | 248<br>248                                 | 310<br>312                                    | 112                           | 17 51<br>61 7                                | .026<br>.026                | .587<br>.587                  |
|  |                                     |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Moderate competition only, good mid and upper RPM torque and HP, bracket racing, auto w/race converter, 11.5 to 12.5 compression ratio advised.  | <b>F-254/382-2S-10</b>              | 3800-7200             | <b>341341<sup>*</sup></b>                  | <b>99257-16</b><br><b>99256-16<sup>c</sup></b> | 254<br>262                                 | 286<br>298                                    | 110                           | 22 52<br>65 17                               | .018<br>.018                | .672<br>.678                  |
|  |                                     |                       | ⚡  |  |  |   |                               |  |                             |                               |
| Moderate competition only, good mid and upper RPM HP, bracket racing, auto w/race converter, good with aftermarket aluminum cylinder heads, 12.0 minimum compression ratio advised.  | <b>F-266/3528-8</b>                 | 4200-7600             | <b>341461<sup>*</sup></b>                  | <b>99257-16</b><br><b>99256-16<sup>c</sup></b> | 266<br>266                                 | 302<br>302                                    | 108                           | 30 56<br>66 20                               | .026<br>.026                | .621<br>.621                  |
|  |                                     |                       | ⚡  |  |  |   |                               |  |                             |                               |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Specify if late 62-406 cu.in. or 63-76 block is used, as the cam is different than the one used in 58-62 block.

**NOTE:** All grinds shown use the stock Ford 1.76 ratio adjustable rocker arms - Ford part number B8A-6564-B or Crane adjustable ductile iron rocker arms, **34772-16**, in order to achieve the listed gross valve lift figures.

**NOTE:** To provide the most accurate valve adjustment on hydraulic roller camshafts, the use of Crane adjustable rocker arms (**34772-16** or **34791-1**) and appropriate pushrods (**special order** or **95805-16**) is highly recommended.

**NOTE:** To effect valve adjustment with mechanical lifter camshafts, the use of Crane adjustable rocker arms (**34772-16** or **34791-1**) and the appropriate pushrods is required.

**NOTE:** In order to use these mechanical lifter camshafts in mechanical lifter only side oiler type blocks, you must groove the center of #2 and #4 cam bearing journals with a .022" radius (.044" width) and .035" deep.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using a pre-1972 crankshaft sprocket, or by degreeing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Some cylinder heads have removable lower spring seats with an inner spring step. This step must be removed to allow the inner springs to set flush with the outer springs.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                    | See pg. 350                                    | See pg. 362           | See pg. 360          | See pg. 306  | See pg. 328                    | See pg. 312           | See pg. 315   | See pg. 321          |
|--------------------------------|--|--|-----------------------|----------------------|--|--------------------------------|-----------------------|---|----------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                  | RETAINERS                                      | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS   | TIMING CHAIN AND GEAR ASSEMBLY | CAST ROCKER ARMS      | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE            |
|                                | 99896-16 <sup>d</sup><br>99832-16 <sup>e</sup> | 99970-16 <sup>f</sup><br>99976-16 <sup>g</sup> | 99822-16 <sup>d</sup> | 99099-1 <sup>i</sup> | j<br>95805-16 <sup>k</sup>   |                                | 34772-16 <sup>p</sup> |   | 34791-1 <sup>q</sup> |
|                                | 99896-16 <sup>d</sup><br>99832-16 <sup>e</sup> | 99970-16 <sup>f</sup><br>99976-16 <sup>g</sup> | 99822-16 <sup>d</sup> | 99099-1 <sup>i</sup> | j<br>95805-16 <sup>k</sup>   |                                | 34772-16 <sup>p</sup> |   | 34791-1 <sup>q</sup> |
|                                | 99896-16 <sup>d</sup><br>99832-16 <sup>e</sup> | 99970-16 <sup>f</sup><br>99976-16 <sup>g</sup> | 99822-16 <sup>d</sup> | 99099-1 <sup>i</sup> | j<br>95805-16 <sup>k</sup>   |                                | 34772-16 <sup>p</sup> |   | 34791-1 <sup>q</sup> |
|                                | 99896-16 <sup>d</sup><br>99832-16 <sup>e</sup> | 99970-16 <sup>f</sup><br>99976-16 <sup>g</sup> | 99822-16 <sup>d</sup> | 99099-1 <sup>i</sup> | j<br>95805-16 <sup>k</sup>   |                                | 34772-16 <sup>p</sup> |   | 34791-1 <sup>q</sup> |
|                                | 99896-16 <sup>d</sup><br>99832-16 <sup>e</sup> | 99970-16 <sup>f</sup><br>99976-16 <sup>g</sup> | 99822-16 <sup>d</sup> | 99099-1 <sup>i</sup> | j<br>95805-16 <sup>k</sup>   |                                | 34772-16 <sup>p</sup> |   | 34791-1 <sup>q</sup> |
|                                | 96877-16 <sup>d</sup>                          | 99969-16 <sup>h</sup>                          | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34621-16 <sup>l</sup><br>34622-16 <sup>m</sup><br>95819-16 <sup>n</sup><br>95847-16 <sup>o</sup> |                                | 34772-16 <sup>p</sup> |   | 34791-1 <sup>q</sup> |
|                                | 96877-16 <sup>d</sup>                          | 99969-16 <sup>h</sup>                          | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34621-16 <sup>l</sup><br>34622-16 <sup>m</sup><br>95819-16 <sup>n</sup><br>95847-16 <sup>o</sup> |                                | 34772-16 <sup>p</sup> |   | 34791-1 <sup>q</sup> |
|                                | 96877-16 <sup>d</sup>                          | 99969-16 <sup>h</sup>                          | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34621-16 <sup>l</sup><br>34622-16 <sup>m</sup><br>95819-16 <sup>n</sup><br>95847-16 <sup>o</sup> |                                | 34772-16 <sup>p</sup> |   | 34791-1 <sup>q</sup> |
|                                | 96877-16 <sup>d</sup>                          | 99969-16 <sup>h</sup>                          | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34621-16 <sup>l</sup><br>34622-16 <sup>m</sup><br>95819-16 <sup>n</sup><br>95847-16 <sup>o</sup> |                                | 34772-16 <sup>p</sup> |   | 34791-1 <sup>q</sup> |
|                                | 96877-16 <sup>d</sup>                          | 99969-16 <sup>h</sup>                          | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34621-16 <sup>l</sup><br>34622-16 <sup>m</sup><br>95819-16 <sup>n</sup><br>95847-16 <sup>o</sup> |                                | 34772-16 <sup>p</sup> |   | 34791-1 <sup>q</sup> |

- a Requires 34970-1 (.467" I.D.) steel, or 34990-1 (.467" I.D.) aluminum-bronze distributor drive gear, and 7/16-14 x 1-1/8" grade 8 cam gear bolt and hardened washer.
- b Vertical locking bar hydraulic roller lifters, no machining required. Special length pushrods are required, refer to page 305 for special pushrod ordering instructions.
- c Shell-type lifters, requires 34622-16 pushrods for 34772-16 rocker arms, or 95847-16 pushrods for 34791-1 rocker arms.
- d Must machine cylinder heads.
- e Ovate wire beehive spring, requires 99976-16 retainers.
- f Requires 99099-1 valve locks.
- g Steel, for 99832-16 beehive springs.
- h Requires 99098-1 valve locks.
- i Machined steel, heat treated.
- j Special length pushrods are required for standard non-adjustable or 34772-16 adjustable rocker arms. See page 305 for special pushrod ordering instructions.
- k For use with 34791-1 adjustable rocker arms with cup type adjusters.
- l Heavy wall, heat treated, for use with 99257-16 lifters and 34772-16 adjustable rocker arms.
- m Heavy wall, heat treated, for use with 99256-16 lifters and 34772-16 adjustable rocker arms.
- n Pro Series one-piece, for use with 99257-16 lifters and 34791-1 adjustable rocker arms with cup type adjusters.
- o Pro Series one-piece, for use with 99256-16 lifters and 34791-1 adjustable rocker arms with cup type adjusters.
- p 1.76 ratio, ductile iron, adjustable, requires appropriate Crane pushrods.
- q 1.76 ratio, with cup type adjusters, complete with shafts, stands, and hardware. For low rise and Edelbrock cylinder heads, requires appropriate Crane pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                           | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|-----------------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b>   |                                  |                       |  |                                   |  |   |                               |  |                             |                               |
| Excellent low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2800+ converter, 3200-3600 cruise rpm, 10.5 to 11.5 compression ratio advised.       | SR-240/350-2S-14                 | 2800-6600             | 348511 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 240<br>248                                 | 290<br>298                                    | 114                           | 11 49<br>63 5                                | .020<br>.020                | .616<br>.637                  |
| Excellent mid range torque and HP, fair idle, moderate performance usage, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 11.0 to 12.0 compression ratio advised.                        | SR-248/362-2S-10                 | 3000-6800             | 348521 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 248<br>256                                 | 285<br>292                                    | 110                           | 19 49<br>63 13                               | .020<br>.020                | .637<br>.658                  |
| Good mid range torque and HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 11.0 to 12.5 compression ratio advised.   | R-252/420-2-8                    | 3400-7200             | 348801 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 252<br>262                                 | 284<br>294                                    | 108                           | 22 50<br>63 19                               | .020<br>.020                | .739<br>.739                  |
| Good mid range HP, rough idle, performance usage, bracket racing, auto trans w/race converter, also large plate or manifold nitrous system, 12.0 minimum compression ratio advised.                          | R-260/420-2-10                   | 3800-7600             | 348821 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 260<br>270                                 | 292<br>302                                    | 110                           | 24 56<br>69 21                               | .020<br>.020                | .739<br>.739                  |
| Competition only, good upper RPM HP, bracket racing, auto trans w/race converter, also manifold nitrous system, good with aftermarket aluminum cylinder heads, 12.0 minimum compression ratio advised.       | R-266/420-2-10                   | 4200-7800             | 348831 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 266<br>276                                 | 298<br>308                                    | 110                           | 27 59<br>72 24                               | .020<br>.020                | .739<br>.739                  |
| Competition only, good upper RPM HP, bracket racing, auto trans w/race converter, also large manifold nitrous system, good with aftermarket aluminum cylinder heads, 12.5 minimum compression ratio advised. | R-276/420-2-10                   | 4600-8200             | 348841 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 276<br>286                                 | 308<br>318                                    | 110                           | 32 64<br>77 29                               | .020<br>.020                | .739<br>.739                  |
| Competition only, good upper RPM HP, manual trans or auto trans w/race converter and trans brake, good with aftermarket aluminum cylinder heads, 13.0 minimum compression ratio advised.                     | R-276/4334-2S2-10                | 4800-8400             | 348291 <sup>a</sup>                        | 35570-16 <sup>b</sup>             | 276<br>282                                 | 316<br>322                                    | 110                           | 31 65<br>74 28                               | .026<br>.026                | .763<br>.727                  |
| Competition only, good upper RPM HP, manual trans or auto trans w/race converter and trans brake, good with aftermarket aluminum cylinder heads, 13.0 minimum compression ratio advised.                     | R-282/427-2S1-8                  | 5000-8400             | 348301 <sup>a</sup>                        | 35570-16 <sup>b</sup>             | 282<br>282                                 | 286<br>320                                    | 108                           | 38 64<br>74 32                               | .028<br>.026                | .752<br>.752                  |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Specify if late 62-406 cu.in. or 63-76 block is used, as the cam is different than the one used in 58-62 block.

**NOTE:** In order to use these camshafts in mechanical lifter only side oiler type blocks, you must groove the center of #2 and #4 cam bearing journals with a .022" radius (.044" width) and .035" deep.

**NOTE:** All grinds shown use the stock Ford 1.76 ratio adjustable rocker arms - Ford part number B8A-6564-B or Crane adjustable ductile iron rocker arms, **34772-16**, in order to achieve the listed gross valve lift figures.

**NOTE:** To effect valve adjustment with roller lifter camshafts, the use of Crane adjustable rocker arms (**34772-16** or **34791-1**) and appropriate pushrods (**34641-16** or **95818-16**) is required.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** Some cylinder heads have removable lower spring seats with an inner spring step. This step must be removed to allow the inner springs to set flush with the outer springs.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>                              | <i>See pg. 350</i>                             | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>                             | <i>See pg. 328</i>             | <i>See pg. 312</i>    | <i>See pg. 315</i>                                  | <i>See pg. 321</i>   |
|--------------------------------|---|--|-----------------------|----------------------|--|--------------------------------|-----------------------|---|----------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                   | RETAINERS                                      | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | CAST ROCKER ARMS      | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE            |
|                                | 99893-16<br>99832-16 <sup>c</sup>               | 99954-16<br>99976-16 <sup>f</sup>              | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34641-16 <sup>j</sup><br>95818-16 <sup>k</sup> |                                | 34772-16 <sup>l</sup> |   | 34791-1 <sup>m</sup> |
|                                | 99893-16<br>99832-16 <sup>c</sup>               | 99954-16<br>99976-16 <sup>f</sup>              | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34641-16 <sup>j</sup><br>95818-16 <sup>k</sup> |                                | 34772-16 <sup>l</sup> |   | 34791-1 <sup>m</sup> |
|                                | 96886-16 <sup>d</sup>                           | 99955-16                                       | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34641-16 <sup>j</sup><br>95818-16 <sup>k</sup> |                                | 34772-16 <sup>l</sup> |   | 34791-1 <sup>m</sup> |
|                                | 96886-16 <sup>d</sup>                           | 99955-16                                       | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34641-16 <sup>j</sup><br>95818-16 <sup>k</sup> |                                | 34772-16 <sup>l</sup> |   | 34791-1 <sup>m</sup> |
|                                | 96886-16 <sup>d</sup>                           | 99955-16                                       | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34641-16 <sup>j</sup><br>95818-16 <sup>k</sup> |                                | 34772-16 <sup>l</sup> |   | 34791-1 <sup>m</sup> |
|                                | 96886-16 <sup>d</sup>                           | 99955-16                                       | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34641-16 <sup>j</sup><br>95818-16 <sup>k</sup> |                                | 34772-16 <sup>l</sup> |   | 34791-1 <sup>m</sup> |
|                                | 96880-16 <sup>d</sup><br>961246-16 <sup>e</sup> | 99679-16 <sup>g</sup><br>99662-16 <sup>h</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34641-16 <sup>j</sup><br>95818-16 <sup>k</sup> |                                | 34772-16 <sup>l</sup> |   | 34791-1 <sup>m</sup> |
|                                | 96880-16 <sup>d</sup><br>961246-16 <sup>e</sup> | 99679-16 <sup>g</sup><br>99662-16 <sup>h</sup> | 99822-16 <sup>d</sup> | 99098-1 <sup>i</sup> | 34641-16 <sup>j</sup><br>95818-16 <sup>k</sup> |                                | 34772-16 <sup>l</sup> |   | 34791-1 <sup>m</sup> |

**a** Requires 34970-1 (.467" I.D.) steel, or 34990-1 (.467" I.D.) aluminum-bronze distributor drive gear, and 7/16-14 x 1-1/8" grade 8 cam gear bolt and hardened washer.  
**b** Ultra Pro Series roller lifters.  
**c** Ovate wire beehive spring, requires 99976-16 retainers.  
**d** Must machine cylinder heads.  
**e** Triple, for 2.050" assembly height, requires 99662-16 titanium retainers.  
**f** Steel for 99832-16 beehive springs.  
**g** Must use 99098-1 valve stem locks, included with the retainers.  
**h** Titanium, for 961246-16 valve springs.  
**i** Machined steel, heat treated.  
**j** For use with 34772-16 adjustable rocker arms, heavy wall, heat treated.  
**k** Pro Series one-piece, for use with 34791-1 adjustable rocker arms with cup type adjusters.  
**l** 1.76 ratio, ductile iron, adjustable, requires appropriate 34641-16 Crane pushrods.  
**m** 1.76 ratio, with cup type adjusters, complete with shafts, stands, and hardware. For low rise and Edelbrock cylinder heads, requires appropriate 95818-16 Crane pushrods.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|---------------------|-----------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |  |  |   |                               |  |                     |                       |
| Brute low end torque, smooth idle, daily usage, EFI compatible, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.  | H-192/2667-2S-10                 | 800-4200              | 350501*                                    | 99280-16 <sup>c</sup>                            | 192<br>204                                 | 248<br>260                                    | 110                           | (9) 21<br>37 (13)                            | .000<br>.000        | .456<br>.487          |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                     |                       |
| Good low end torque, smooth idle, daily usage, EFI compatible, off road, towing, economy, also mild turbo-charged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.   | H-260-2                          | 1200-4800             | 353901*<br>353902 <sup>a</sup>             | 99280-16 <sup>c</sup>                            | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000        | .487<br>.518          |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                     |                       |
| Good low end torque, towing, good idle, daily usage, mild off road, economy, good low and mid-range torque and HP, also mild turbocharged, 2400-2800 cruise RPM, 8.5 to 10.0 compression ratio advised.  | H-266-2                          | 1400-5000             | 353931*<br>353932 <sup>a</sup>             | 99280-16 <sup>c</sup>                            | 210<br>218                                 | 266<br>274                                    | 114                           | (4) 34<br>48 (10)                            | .000<br>.000        | .487<br>.504          |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                     |                       |
| Excellent low end and mid range torque and HP, good idle, daily usage and off road, towing, performance and fuel efficiency, marine performance, mild supercharged, 2200-2600 cruise RPM, 8.75 to 10.5 compression ratio advised.  | H-272-2                          | 1800-5400             | 353941*<br>353942 <sup>a</sup>             | 99280-16 <sup>c</sup>                            | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000        | .518<br>.513          |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                     |                       |
| Fair idle, performance usage, good mid-range torque and HP, auto w/2200+ converter, 3200-3600 cruise RPM, serious off road, heavy limited oval track, bracket racing: Street, Heavy; 9.0 to 10.5 compression ratio advised.  | H-226/314-2-8                    | 2200-5800             | 350541*                                    | 99280-16 <sup>c</sup><br>99380-16 <sup>c,d</sup> | 226<br>236                                 | 286<br>296                                    | 108                           | 10 36<br>51 5                                | .000<br>.000        | .537<br>.556          |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                     |                       |
| Fair idle, performance usage, good mid-range HP, auto w/2500+ converter, 3400-3800 cruise RPM, oval track: Street Stock, Enduro, Hobby, 1/4-3/8 mile; bracket racing: Street, Heavy, Pro E.T., Super E.T.; Also mild super-charged, 9.5 to 11.0 compression ratio advised. | H-288-2                          | 2400-6000             | 354551*<br>354552 <sup>b</sup>             | 99280-16 <sup>c</sup><br>99380-16 <sup>c,d</sup> | 226<br>230                                 | 288<br>292                                    | 112                           | 6 40<br>52 (2)                               | .000<br>.000        | .522<br>.530          |
|  |                                  |                       | ⚡  |  |  |   |                               |  |                     |                       |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**IMPORTANT:** Check your hydraulic lifter preload, with your original pushrods, to first determine if different pushrods may be required. On 72-97 engines, if your hydraulic lifter preload is excessive, this can be remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**IMPORTANT:** Crane offers Pushrod Guideplate and Rocker Arm Stud Conversion Kits, (35655-16 and 52655-16) for street applications, enabling the 370-429-460 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. See page 325 for details.

**NOTE:** To provide the most accurate valve adjustment on hydraulic lifter camshafts, in other than 429 Super C.J. engines, a method of effecting valve adjustment is required. On 68-71 engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. On 72-97 engines, the heads must be machined to use 99159-16 screw-in studs and pushrod guideplates.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. Refer to page 305 for special pushrod ordering instructions, and page 374 for checking your hydraulic lifter preload.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 35975-1 timing chain and gear set, a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** These camshafts also fit the 1969-70 Ford 429 Boss Hemi V-8 engines. Some kit components will differ. Contact Crane's Performance Consultants for details.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                    | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306   | See pg. 328                    | See pg. 312           | See pg. 315                                    | See pg. 317                                    |
|--------------------------------|--|-----------------------------------|-----------------------|--|---|--------------------------------|-----------------------|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                  | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS     | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE                            |
| 35308-1 <sup>e</sup>           | 96801-16 <sup>e</sup><br>99839-16 <sup>f</sup> | 99944-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>h</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 35622-16 <sup>k</sup><br>35621-16 <sup>l</sup>                          | 35975-1 <sup>n</sup>           | 52800-16 <sup>o</sup> | 27774-16 <sup>p</sup><br>27744-16 <sup>q</sup> | 27750-16 <sup>r</sup><br>27771-16 <sup>s</sup> |
| 35308-1 <sup>e</sup>           | 96801-16 <sup>e</sup><br>99839-16 <sup>f</sup> | 99944-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>h</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 35622-16 <sup>k</sup><br>35621-16 <sup>l</sup>                          | 35975-1 <sup>n</sup>           | 52800-16 <sup>o</sup> | 27774-16 <sup>p</sup><br>27744-16 <sup>q</sup> | 27750-16 <sup>r</sup><br>27771-16 <sup>s</sup> |
| 35308-1 <sup>e</sup>           | 96801-16 <sup>e</sup><br>99839-16 <sup>f</sup> | 99944-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>h</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 35622-16 <sup>k</sup><br>35621-16 <sup>l</sup>                          | 35975-1 <sup>n</sup>           | 52800-16 <sup>o</sup> | 27774-16 <sup>p</sup><br>27744-16 <sup>q</sup> | 27750-16 <sup>r</sup><br>27771-16 <sup>s</sup> |
| 35308-1 <sup>e</sup>           | 96801-16 <sup>e</sup><br>99839-16 <sup>f</sup> | 99944-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>h</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | 35622-16 <sup>k</sup><br>35621-16 <sup>l</sup>                          | 35975-1 <sup>n</sup>           | 52800-16 <sup>o</sup> | 27774-16 <sup>p</sup><br>27744-16 <sup>q</sup> | 27750-16 <sup>r</sup><br>27771-16 <sup>s</sup> |
|                                | 99893-16                                       | 99953-16                          | 99820-16 <sup>h</sup> | 99097-1 <sup>i</sup>                         | 35622-16 <sup>k</sup><br>35621-16 <sup>l</sup><br>95653-16 <sup>m</sup> | 35975-1 <sup>n</sup>           | 52800-16 <sup>o</sup> | 27774-16 <sup>p</sup><br>27744-16 <sup>q</sup> | 27750-16 <sup>r</sup><br>27771-16 <sup>s</sup> |
|                                | 99893-16                                       | 99953-16                          | 99820-16 <sup>h</sup> | 99097-1 <sup>i</sup>                         | 35622-16 <sup>k</sup><br>35621-16 <sup>l</sup><br>95653-16 <sup>m</sup> | 35975-1 <sup>n</sup>           | 52800-16 <sup>o</sup> | 27774-16 <sup>p</sup><br>27744-16 <sup>q</sup> | 27750-16 <sup>r</sup><br>27771-16 <sup>s</sup> |

**Section Continued**

- a Cam and Lifter Kit, includes installation lubricants.
- b Cam, lifter, valve spring, and retainer kit, includes installation lubricants.
- c May require appropriate Crane pushrods, see **IMPORTANT NOTE** on opposite page.
- d Optional Hi Intensity hydraulic lifters, see page 292 for details.
- e Contains standard diameter valve springs, no machining required for installation.
- f Optional 1.800" assembly height springs, requires **99969-16** retainers and **99094-1** valve locks.
- g Requires **99094-1** Multi Fit valve locks.
- h Must machine cylinder heads.
- i Machined steel, heat treated.
- j Machined steel, heat treated Multi Fit.
- k Heavy wall, heat treated, for non-guideplate or guideplate cylinder heads.
- l For 429 Super CJ, heavy wall, heat treated, for use with pushrod guideplate cylinder heads.
- m Pro Series one-piece, for use with pushrod guideplate cylinder heads.
- n Performance steel billet gears and roller chain set.
- o 1.71 ratio, pedestal mount, non-adjustable, for 72-97 engines.
- p Crane Classic extruded, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- q EnergiZER, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer Available, see page 363.
- r 1.73 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- s 1.73 ratio Wide Body, requires 7/16" rocker arm studs and pushrod guideplates. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|---------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |  |  |   |                               |  |                     |                               |
| Fair idle, performance usage, good mid-range HP, 3600-4000 cruise RPM, auto w/3000+ converter, bracket racing: Pro E.T., Super E.T., Super Pro; good with plate nitrous system, 11.0 to 12.0 compression ratio advised. Good with supercharger, 15 lbs. maximum boost w/8.5 maximum compression ratio advised. | H-230/318-2-14                   | 2600-6200             | 350551*                                    | 99280-16 <sup>b</sup><br>99380-16 <sup>b,c</sup> | 230  | 290   | 114                           | 6 44   | .000                | .544                          |
|  |                                  |                       |  |  | 240  | 300   | 59 1                          | .000   | .563                |                               |
| Fair idle, performance usage, good mid-range HP, 3800-4200 cruise RPM, auto w/3000+ converter, oval track: Street Stock, Enduro, Hobby, 3/8-1/2 mile; bracket racing: Pro E.T., Super E.T., Super Pro, Hot Rod; 10.0 to 11.5 compression ratio advised.  | H-296-2                          | 3000-6600             | 354561*<br>354562 <sup>ta</sup>            | 99280-16 <sup>b</sup><br>99380-16 <sup>b,c</sup> | 236  | 296   | 110                           | 13 43  | .000                | .556                          |
|  |                                  |                       |  |  | 240  | 300   | 55 5                          | .000   | .563                |                               |
| Performance usage, good upper RPM HP, rough idle, bracket racing, auto w/race converter, good with manifold nitrous system, 11.5 to 13.0 compression ratio advised.  | H-244/3439-2S-12                 | 3200-6800             | 350561*                                    | 99280-16 <sup>b</sup><br>99380-16 <sup>b,c</sup> | 244  | 300   | 112                           | 15 49  | .000                | .588                          |
|  |                                  |                       |  |  | 252  | 308   | 63 9                          | .000   | .599                |                               |
| Performance usage, good upper RPM HP, bracket racing, auto w/race converter, aluminum cylinder heads advised, 12.0 to 13.5 compression ratio advised.  | H-248/3500-8                     | 3400-7000             | 350681*                                    | 99280-16 <sup>b</sup><br>99380-16 <sup>b,c</sup> | 248  | 304   | 108                           | 21 47  | .000                | .599                          |
|  |                                  |                       |  |  | 248  | 304   | 57 11                         | .000   | .599                |                               |
| Performance usage, good upper RPM HP, drag racing, auto w/race converter, good with manifold nitrous system, aluminum cylinder heads recommended, 13.5 to 14.5 compression ratio advised. Good w/Roots supercharger, 22 lbs. maximum boost w/8.5 maximum compression ratio advised.                            | H-252/364-2S-12                  | 3800-7200             | 350571*                                    | 99280-16 <sup>b</sup><br>99380-16 <sup>b,c</sup> | 252  | 304   | 112                           | 19 53  | .000                | .622                          |
|  |                                  |                       |  |  | 262  | 314   | 68 14                         | .000   | .604                |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**IMPORTANT:** Check your hydraulic lifter preload, with your original pushrods, to first determine if different pushrods may be required. On 72-97 engines, if your hydraulic lifter preload is excessive, this can be remedied by using Crane's Rocker Arm Pedestal Shim Kit (99170-1). Refer to page 324 for details.

**IMPORTANT:** Crane offers Pushrod Guideplate and Rocker Arm Stud Conversion Kits, (35655-16 and 52655-16) for street applications, enabling the 370-429-460 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. See page 325 for details.

**NOTE:** To provide the most accurate valve adjustment on hydraulic lifter camshafts, in other than 429 Super C.J. engines, a method of effecting valve adjustment is required. On 68-71 engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. On 72-97 engines, the heads must be machined to use 99159-16 screw-in studs and pushrod guideplates.

**NOTE:** Special length pushrods can be ordered to provide proper hydraulic lifter preload. Refer to page 305 for special pushrod ordering instructions, and page 374 for checking your hydraulic lifter preload.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 35975-1 timing chain and gear set, a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** These camshafts also fit the 1969-70 Ford 429 Boss Hemi V-8 engines. Some kit components will differ. Contact Crane's Performance Consultants for details.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337   | See pg. 350 | See pg. 362           | See pg. 360          | See pg. 306   | See pg. 328                    | See pg. 312           | See pg. 315   | See pg. 317                                    |
|--------------------------------|---------------|-------------|-----------------------|----------------------|---|--------------------------------|-----------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS     | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 99893-16      | 99953-16    | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup> | 35622-16 <sup>f</sup><br>35621-16 <sup>g</sup>                          | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup>      | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99893-16      | 99953-16    | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup> | 35622-16 <sup>f</sup><br>35621-16 <sup>g</sup>                          | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup>      | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99893-16      | 99953-16    | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup> | 35622-16 <sup>f</sup><br>35621-16 <sup>g</sup><br>95653-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup>      | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99893-16      | 99953-16    | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup> | 35622-16 <sup>f</sup><br>35621-16 <sup>g</sup>                          | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup>      | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99893-16      | 99953-16    | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup> | 35622-16 <sup>f</sup><br>35621-16 <sup>g</sup><br>95653-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup>      | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |

- a Cam, lifter, valve spring, and retainer kit, includes installation lubricants.
- b May require appropriate Crane pushrods, see **IMPORTANT NOTE** on opposite page.
- c Optional Hi Intensity hydraulic lifters, see page 292 for details.
- d Must machine cylinder heads.
- e Machined steel, heat treated.
- f Heavy wall, heat treated, for non-guideplate or guideplate cylinder heads.
- g For 429 Super CJ, heavy wall, heat treated, for use with pushrod guideplate cylinder heads.
- h Pro Series one-piece, for use with pushrod guideplate cylinder heads.
- i Performance steel billet gears and roller chain set.

- j 1.71 ratio, pedestal mount, non-adjustable, for 72-97 engines.
- k Crane Classic extruded, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- l Energizer, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- m 1.73 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- n 1.73 ratio Wide Body, requires 7/16" rocker arm studs and pushrod guideplates. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 294

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                     | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |                                  |                       |  |                             |  |   |                               |  |                             |                               |
| Brute low end torque, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-3000 cruise RPM, 8.0 to 9.5 compression ratio advised.  | <b>HR-200/311-2S-12</b>          | 800-4600              | <b>359331<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b> | 200<br>212                                 | 262<br>274                                    | 112                           | (7) 27<br>43 (11)                            | .000<br>.000                | .532<br>.568                  |
|   |                                  |                       | ◆  |                             |  |   |                               |  |                             |                               |
| Excellent low end torque and HP, smooth idle, daily usage, off road, towing, performance and fuel efficiency, also mild turbocharged, 2400-3200 cruise RPM, 8.5 to 10.0 compression ratio advised.  | <b>HR-212/332-2S-14</b>          | 1200-5000             | <b>359371<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b> | 212<br>216                                 | 274<br>278                                    | 114                           | (3) 35<br>47 (11)                            | .000<br>.000                | .568<br>.556                  |
|   |                                  |                       | ◆  |                             |  |   |                               |  |                             |                               |
| Good low end torque, good idle, daily usage, off road, towing, performance and fuel efficiency, 2600-3400 cruise RPM, 8.75 to 10.5 compression ratio advised.   | <b>HR-216/325-2S-12</b>          | 1400-5400             | <b>359341<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b> | 216<br>224                                 | 278<br>286                                    | 112                           | 1 35<br>49 (5)                               | .000<br>.000                | .556<br>.580                  |
|   |                                  |                       | ◆  |                             |  |   |                               |  |                             |                               |
| Good mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto w/2500+ converter, mild supercharged, 3000-3800 cruise RPM, 9.5 to 11.0 compression ratio advised.   | <b>HR-228/345-2S-14</b>          | 2200-6200             | <b>359351<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b> | 228<br>238                                 | 290<br>300                                    | 114                           | 5 43<br>58 0                                 | .000<br>.000                | .590<br>.614                  |
|   |                                  |                       | ◆  |                             |  |   |                               |  |                             |                               |
| Good mid range torque and HP, rough idle, moderate performance usage, mild bracket racing with heavy car, serious off road, auto w/2800+ converter, 3200-3800 cruise RPM, 10.0 to 11.5 compression ratio advised.   | <b>HR-234/340-2S-10</b>          | 2400-6400             | <b>359381<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b> | 234<br>242                                 | 300<br>308                                    | 110                           | 12 42<br>56 6                                | .000<br>.000                | .581<br>.581                  |
|   |                                  |                       | ◆  |                             |  |   |                               |  |                             |                               |
| Good mid to upper RPM torque and HP, fair idle, performance usage, bracket racing, auto trans w/3000+ converter, also mild supercharged, best with 514+ cu.in., 10.5 to 12.0 compression ratio advised.   | <b>HR-238/359-2S-12</b>          | 3000-6600             | <b>359361<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b> | 238<br>246                                 | 300<br>308                                    | 112                           | 12 46<br>60 6                                | .000<br>.000                | .614<br>.636                  |
|   |                                  |                       | ◆  |                             |  |   |                               |  |                             |                               |
| Good mid to upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, best with 514+ cu.in., 11.0 to 12.5 compression ratio advised.  | <b>HR-246/372-2S-12</b>          | 3200-6800             | <b>359391<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b> | 246<br>250                                 | 308<br>312                                    | 112                           | 16 50<br>62 8                                | .000<br>.000                | .636<br>.636                  |
|   |                                  |                       | ◆  |                             |  |   |                               |  |                             |                               |
| Performance usage, bracket racing, auto trans w/race converter, good w/large manifold nitrous system, best with 540+ cu.in., 12.5 minimum compression ratio advised. Good with large Roots supercharger, 22 lbs. maximum boost w/8.5 maximum compression ratio advised. | <b>HR-258/372-2S-14</b>          | 3600-6800             | <b>359401<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b> | 258<br>266                                 | 320<br>328                                    | 114                           | 20 58<br>72 14                               | .000<br>.000                | .636<br>.636                  |
|   |                                  |                       | ◆  |                             |  |   |                               |  |                             |                               |
| Performance usage, best in 570+ cu.in., auto trans w/race converter, 13.5 minimum compression ratio advised. Good with large Roots supercharger w/aluminum cylinder heads, 26 lbs. maximum boost w/8.5 maximum compression ratio advised.                               | <b>HR-264/400-2S-14</b>          | 4000-6800             | <b>359411<sup>a</sup></b>                  | <b>35532-16<sup>b</sup></b> | 264<br>268                                 | 334<br>338                                    | 114                           | 22.5 61.5<br>72.5 15.5                       | .000<br>.000                | .684<br>.684                  |
|   |                                  |                       | ◆  |                             |  |   |                               |  |                             |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**  
**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.  
**NOTE:** Special length pushrods must be ordered to provide proper hydraulic roller lifter preload. Refer to page 305 for special pushrod ordering instructions, and page 374 for checking your hydraulic lifter preload.

**IMPORTANT:** Crane offers Pushrod Guideplate and Rocker Arm Stud Conversion Kits, (35655-16 and 52655-16) for street applications, enabling the 370-429-460 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. See page 325 for details.  
**NOTE:** To provide the most accurate valve adjustment on hydraulic roller lifter camshafts, in other than 429 Super C.J. engines, a method of effecting valve adjustment is required. On 68-71 engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. On 72-97 engines, the heads must be machined to use 429 Super C.J. rockers, studs, and pushrod guideplates.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 35975-1 timing chain and gear assembly, a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.  
**NOTE:** These camshafts also fit the 1969-70 Ford 429 Boss Hemi V-8 engines. Some kit components will differ. Contact Crane's Performance Consultants for details.



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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337   | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                    | See pg. 312           | See pg. 315                                    | See pg. 317                                    |
|--------------------------------|---------------|-----------------------------------|-----------------------|--|--|--------------------------------|-----------------------|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS     | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE                            |
|                                | 96870-16      | 99957-16<br>99969-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95639-16 <sup>g</sup><br>95641-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup> | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 96870-16      | 99957-16<br>99969-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95639-16 <sup>g</sup><br>95641-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup> | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 96870-16      | 99957-16<br>99969-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95639-16 <sup>g</sup><br>95641-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup> | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99896-16      | 99956-16<br>99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95639-16 <sup>g</sup><br>95641-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup> | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99896-16      | 99956-16<br>99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95639-16 <sup>g</sup><br>95641-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup> | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99896-16      | 99956-16<br>99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95639-16 <sup>g</sup><br>95641-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup> | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99896-16      | 99956-16<br>99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95639-16 <sup>g</sup><br>95641-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup> | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99896-16      | 99956-16<br>99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95639-16 <sup>g</sup><br>95641-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup> | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99896-16      | 99956-16<br>99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95639-16 <sup>g</sup><br>95641-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup> | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |
|                                | 99896-16      | 99956-16<br>99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 95639-16 <sup>g</sup><br>95641-16 <sup>h</sup> | 35975-1 <sup>i</sup>           | 52800-16 <sup>j</sup> | 27774-16 <sup>k</sup><br>27744-16 <sup>l</sup> | 27750-16 <sup>m</sup><br>27771-16 <sup>n</sup> |

- a Requires 52970-1 (.500" I.D.) or 52971-1 (.531" I.D.) steel, or 52990-1 (.500" I.D.) or 52989-1 (.531" I.D.) aluminum-bronze distributor drive gear, and 7/16-20 x 1-1/4" grade 8 cam gear bolt and hardened washer.
- b Vertical locking bar hydraulic roller lifters, no machining required. Special length pushrods are required.
- c Requires Crane Multi Fit valve locks.
- d Must machine cylinder heads.
- e Machined steel, heat treated.
- f Machined steel, heat treated, Multi Fit.
- g Pro Series one-piece, for non-guideplate cylinder heads.
- h Pro Series one-piece, for use with pushrod guideplate cylinder heads.
- i Performance steel billet gears and roller chain set.
- j 1.71 ratio, pedestal mount, non-adjustable, for 72-97 engines.
- k Crane Classic extruded, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- l EnergiZER, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- m 1.73 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- n 1.73 ratio Wide Body, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS               | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| Good low end and mid range torque and HP, fair idle, moderate performance usage, bracket racing: Super Pro, Hot Rod, auto trans w/2500+ converter; off road, 10.0 to 11.5 compression ratio advised.  | F-238/3200-2-12                  | 3000-<br>6600         | 351201*                                    | 99257-16 <sup>b</sup> | 238  | 300   | 112                           | 12 46  | .022                        | .547                          |
|   |                                  |                       |  |                       | 248  | 310   | 61 7                          | .022   | .570                        |                               |
| Rough idle, performance usage, oval track: Late Model, Sportsman, 1/4-3/8 mile; bracket racing: Super Pro, Hot Rod, auto trans w/3000+ converter; serious off road, 10.5 to 12.0 compression ratio advised.   | F-246/3294-2-8                   | 3600-<br>7000         | 351211*<br>351212 <sup>a</sup>             | 99257-16 <sup>b</sup> | 246  | 282   | 108                           | 20 46  | .026                        | .563                          |
|   |                                  |                       |  |                       | 256  | 292   | 61 15                         | .026   | .583                        |                               |
| Rough idle, performance usage, good mid to upper RPM torque and HP, bracket racing, auto trans w/3500+ converter, 11.0 to 12.5 compression ratio advised.   | F-256/3412-2-8                   | 4000-<br>7400         | 351341*                                    | 99257-16 <sup>b</sup> | 256  | 292   | 108                           | 25 51  | .026                        | .583                          |
|   |                                  |                       |  |                       | 266  | 302   | 66 20                         | .026   | .603                        |                               |
| Fair idle, performance usage, good upper RPM torque and HP, bracket racing, good w/plate nitrous system, auto trans w/3500+ converter, 11.5 to 12.5 compression ratio advised.  | F-256/3412-2-12                  | 2200-<br>6200         | 351351*                                    | 99257-16 <sup>b</sup> | 256  | 292   | 112                           | 19 57  | .026                        | .583                          |
|   |                                  |                       |  |                       | 266  | 302   | 68 18                         | .026   | .603                        |                               |
| Moderate competition only, good mid to upper RPM HP, bracket racing, auto trans w/3500+ converter, 11.5 to 13.0 compression ratio advised.  | F-266/3528-2-8                   | 4400-<br>7800         | 351511*                                    | 99257-16 <sup>b</sup> | 266  | 302   | 108                           | 30 56  | .026                        | .603                          |
|   |                                  |                       |  |                       | 276  | 312   | 71 25                         | .026   | .624                        |                               |
| Moderate competition only, good mid to upper RPM HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.   | F-272/3874-2S-8                  | 4600-<br>8000         | 351601*                                    | 99257-16 <sup>b</sup> | 272  | 308   | 108                           | 33 59  | .026                        | .662                          |
|   |                                  |                       |  |                       | 280  | 316   | 73 27                         | .026   | .683                        |                               |
| Competition only, good upper RPM HP, bracket racing, good with large plate or manifold nitrous system, auto trans w/race converter, 13.0 minimum compression ratio advised. Good w/large Roots supercharger, 22 lbs. maximum boost w/8.0 maximum compression ratio advised. | F-272/3874-2S-12                 | 4800-<br>8200         | 351611*                                    | 99257-16 <sup>b</sup> | 272  | 308   | 112                           | 28 64  | .026                        | .662                          |
|   |                                  |                       |  |                       | 280  | 316   | 76 24                         | .026   | .683                        |                               |
| Competition only, good upper RPM torque and HP, bracket racing in heavy car, good w/514+ cu.in., aluminum cylinder heads advised, auto trans w/race converter, 13.0 minimum compression ratio advised.  | F-274/3934-2S-10                 | 4600-<br>8200         | 351621*                                    | 99257-16 <sup>b</sup> | 274  | 304   | 110                           | 31 63  | .012                        | .673                          |
|   |                                  |                       |  |                       | 278  | 308   | 73 25                         | .012   | .684                        |                               |
| Radical competition only, good upper RPM HP, flat tappet restricted classes, good w/540+ cu.in.w/ aluminum cylinder heads, auto trans w/race converter, 13.5 minimum compression ratio advised.   | F-286/3765-2S-12                 | 5000-<br>8400         | 351631*                                    | 99257-16 <sup>b</sup> | 286  | 322   | 112                           | 34 72  | .026                        | .644                          |
|   |                                  |                       |  |                       | 292  | 332   | 83 29                         | .030   | .653                        |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**IMPORTANT:** Crane offers Pushrod Guideplate and Rocker Arm Stud Conversion Kits, (35655-16 and 52655-16) for street applications, enabling the 370-429-460 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. See page 325 for details.

**NOTE:** When installing mechanical lifter series cams and kits, in other than 429 Super C.J. engines, a method of effecting valve adjustment is required. On 68-71 engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. On 72-97 engines, the heads must be machined to use 99159-16 screw-in studs and pushrod guideplates.

**NOTE:** Many 1972 and later Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 35975-1 timing chain and gear assembly, a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** These camshafts also fit the 1969-70 Ford 429 Boss Hemi V-8 engines. Some kit components will differ. Contact Crane's Performance Consultants for details.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i> | <i>See pg. 350</i>    | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>                             | <i>See pg. 328</i>             | <i>See pg. 312</i> | <i>See pg. 315</i>                                  | <i>See pg. 317</i>                             |
|--------------------------------|--------------------|-----------------------|-----------------------|----------------------|--|--------------------------------|--------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS      | RETAINERS             | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 99890-16           | 99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99094-1 <sup>e</sup> | 35621-16 <sup>f</sup><br>95653-16 <sup>g</sup> | 35975-1 <sup>h</sup>           |                    | 27774-16 <sup>i</sup>                               | 27750-16 <sup>j</sup><br>27771-16 <sup>k</sup> |
|                                | 99890-16           | 99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99094-1 <sup>e</sup> | 35621-16 <sup>f</sup><br>95653-16 <sup>g</sup> | 35975-1 <sup>h</sup>           |                    | 27774-16 <sup>i</sup>                               | 27750-16 <sup>j</sup><br>27771-16 <sup>k</sup> |
|                                | 99890-16           | 99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99094-1 <sup>e</sup> | 35621-16 <sup>f</sup><br>95653-16 <sup>g</sup> | 35975-1 <sup>h</sup>           |                    | 27774-16 <sup>i</sup>                               | 27750-16 <sup>j</sup><br>27771-16 <sup>k</sup> |
|                                | 99890-16           | 99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99094-1 <sup>e</sup> | 35621-16 <sup>f</sup><br>95653-16 <sup>g</sup> | 35975-1 <sup>h</sup>           |                    | 27774-16 <sup>i</sup>                               | 27750-16 <sup>j</sup><br>27771-16 <sup>k</sup> |
|                                | 99890-16           | 99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99094-1 <sup>e</sup> | 35621-16 <sup>f</sup><br>95653-16 <sup>g</sup> | 35975-1 <sup>h</sup>           |                    | 27774-16 <sup>i</sup>                               | 27750-16 <sup>j</sup><br>27771-16 <sup>k</sup> |
|                                | 99890-16           | 99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99094-1 <sup>e</sup> | 35621-16 <sup>f</sup><br>95653-16 <sup>g</sup> | 35975-1 <sup>h</sup>           |                    | 27774-16 <sup>i</sup>                               | 27750-16 <sup>j</sup><br>27771-16 <sup>k</sup> |
|                                | 99890-16           | 99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99094-1 <sup>e</sup> | 35621-16 <sup>f</sup><br>95653-16 <sup>g</sup> | 35975-1 <sup>h</sup>           |                    | 27774-16 <sup>i</sup>                               | 27750-16 <sup>j</sup><br>27771-16 <sup>k</sup> |
|                                | 99890-16           | 99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99094-1 <sup>e</sup> | 35621-16 <sup>f</sup><br>95653-16 <sup>g</sup> | 35975-1 <sup>h</sup>           |                    | 27774-16 <sup>i</sup>                               | 27750-16 <sup>j</sup><br>27771-16 <sup>k</sup> |
|                                | 99890-16           | 99970-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99094-1 <sup>e</sup> | 35621-16 <sup>f</sup><br>95653-16 <sup>g</sup> | 35975-1 <sup>h</sup>           |                    | 27774-16 <sup>i</sup>                               | 27750-16 <sup>j</sup><br>27771-16 <sup>k</sup> |

- a** Cam, lifter, valve spring, and retainer kit, includes installation lubricants.
- b** Requires appropriate Crane pushrods.
- c** Requires Crane Multi Fit valve locks.
- d** Must machine cylinder heads.
- e** Machined steel, heat treated, Multi Fit.
- f** Heavy wall, heat treated, for use with pushrod guideplate cylinder heads.
- g** Pro Series one-piece, for use with pushrod guideplate cylinder heads.

- h** Performance steel billet gears and roller chain set.
- i** Crane Classic extruded, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- j** 1.73 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- k** 1.73 ratio Wide Body, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                           | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------------------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b>  |                                  |                       |  |                                   |  |   |                               |  |                             |                               |
| Excellent low and mid range torque, fair idle, moderate performance usage, good low and mid-range HP, mild bracket racing, auto trans w/2500+ converter, 10.5 to 11.5 compression ratio advised.                    | SR-232/338-2S-12                 | 2500-6500             | 358501 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 232  | 282   | 112                           | 9 46   | .020                        | .578                          |
|   |                                  |                       |  |                                   | 240  | 290   | 57 3                          | .020   | .599                        |                               |
| Good low and mid range torque and HP, fair idle, moderate performance usage, bracket racing, auto trans w/3500+ converter, 3800-4200 cruise RPM, 10.5 to 12.0 compression ratio advised.                            | SR-248/362-2S1-12                | 3000-6800             | 358511 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 248  | 298   | 112                           | 17 51  | .020                        | .619                          |
|   |                                  |                       |  |                                   | 256  | 306   | 65 11                         | .020   | .640                        |                               |
| Good low and mid range torque and HP, rough idle, performance usage, bracket racing, auto trans w/3000+ converter, 11.0 to 12.5 compression ratio advised.  | R-252/420-2-10                   | 3400-7200             | 358801 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 252  | 284   | 110                           | 20 52  | .020                        | .718                          |
|   |                                  |                       |  |                                   | 262  | 294   | 65 17                         | .020   | .718                        |                               |
| Good mid range torque to upper RPM torque & HP, rough idle, performance usage, 514+ cu.in., Pro Street, bracket racing, auto trans w/3500+ converter, 4200-4600 cruise RPM, 11.0 minimum compression ratio advised. | SR-252/400-2S-10                 | 3200-7000             | 358521 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 252  | 290   | 110                           | 21 51  | .020                        | .684                          |
|   |                                  |                       |  |                                   | 260  | 298   | 65 15                         | .022   | .684                        |                               |
| Good mid range torque and HP, rough idle, radical street, performance usage, serious off road, bracket racing w/ heavy car, auto trans w/3500+ converter, 11.5 to 12.5 minimum compression ratio advised.           | R-258/420-2S-8                   | 3600-7400             | 358201 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 258  | 290   | 108                           | 25 53  | .020                        | .718                          |
|   |                                  |                       |  |                                   | 268  | 300   | 66 22                         | .020   | .718                        |                               |
| Performance usage, good mid-range HP, bracket racing, good w/514+ cu.in., auto trans w/race converter, 12.5 minimum compression ratio advised. Good with manifold nitrous system.                                   | R-266/434-2S-12                  | 3800-7800             | 358211 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 266  | 300   | 112                           | 25 61  | .020                        | .742                          |
|   |                                  |                       |  |                                   | 278  | 310   | 75 23                         | .020   | .718                        |                               |
| Performance usage, good mid-range HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.  | R-268/420-2-10                   | 4000-7800             | 358821 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 268  | 300   | 110                           | 28 60  | .020                        | .718                          |
|   |                                  |                       |  |                                   | 278  | 310   | 73 25                         | .020   | .718                        |                               |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**IMPORTANT:** Crane offers Pushrod Guideplate and Rocker Arm Stud Conversion Kits, (35655-16 and 52655-16) for street applications, enabling the 370-429-460 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. See page 325 for details.

**NOTE:** Roller camshafts with SFO1 firing order (1-5-4-8-6-3-7-2) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** When installing roller lifter series cams and kits, in other than 429 Super C.J. engines, a method of effecting valve adjustment is required. On 68-71 engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. On 72-97 engines, the heads must be machined to use 99159-16 screw-in studs and pushrod guideplates.

**NOTE:** Many 1972-97 Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 35975-1 timing chain and gear assembly, a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** These camshafts also fit the 1969-70 Ford 429 Boss Hemi V-8 engines. Some kit components will differ. Contact Crane's Performance Consultants for details.

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**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337   | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                    | See pg. 312       | See pg. 315   | See pg. 317                                    |
|--------------------------------|---------------|-----------------------------------|-----------------------|--|--|--------------------------------|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 99893-16      | 99953-16                          | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup>                         | 35621-16 <sup>g</sup><br>95653-16 <sup>h</sup> | 35975-1 <sup>i</sup>           |                   | 27774-16 <sup>j</sup>                               | 27750-16 <sup>k</sup><br>27771-16 <sup>l</sup> |
|                                | 99893-16      | 99953-16                          | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup>                         | 35621-16 <sup>g</sup><br>95653-16 <sup>h</sup> | 35975-1 <sup>i</sup>           |                   | 27774-16 <sup>j</sup>                               | 27750-16 <sup>k</sup><br>27771-16 <sup>l</sup> |
|                                | 99885-16      | 99956-16<br>99974-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 35621-16 <sup>g</sup><br>95653-16 <sup>h</sup> | 35975-1 <sup>i</sup>           |                   | 27774-16 <sup>j</sup>                               | 27750-16 <sup>k</sup><br>27771-16 <sup>l</sup> |
|                                | 99893-16      | 99953-16                          | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup>                         | 35621-16 <sup>g</sup><br>95653-16 <sup>h</sup> | 35975-1 <sup>i</sup>           |                   | 27774-16 <sup>j</sup>                               | 27750-16 <sup>k</sup><br>27771-16 <sup>l</sup> |
|                                | 99885-16      | 99956-16<br>99974-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 35621-16 <sup>g</sup><br>95653-16 <sup>h</sup> | 35975-1 <sup>i</sup>           |                   | 27774-16 <sup>j</sup>                               | 27750-16 <sup>k</sup><br>27771-16 <sup>l</sup> |
|                                | 99885-16      | 99956-16<br>99974-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 35621-16 <sup>g</sup><br>95653-16 <sup>h</sup> | 35975-1 <sup>i</sup>           |                   | 27774-16 <sup>j</sup>                               | 27750-16 <sup>k</sup><br>27771-16 <sup>l</sup> |
|                                | 99885-16      | 99956-16<br>99974-16 <sup>c</sup> | 99820-16 <sup>d</sup> | 99097-1 <sup>e</sup><br>99094-1 <sup>f</sup> | 35621-16 <sup>g</sup><br>95653-16 <sup>h</sup> | 35975-1 <sup>i</sup>           |                   | 27774-16 <sup>j</sup>                               | 27750-16 <sup>k</sup><br>27771-16 <sup>l</sup> |

**Section Continued**

- a** Requires 52970-1 (.500" I.D.) or 52971-1 (.531" I.D.) steel, or 52990-1 (.500" I.D.) or 52989-1 (.531" I.D.) aluminum-bronze distributor drive gear, and 7/16-20 x 1-1/4" grade 8 cam gear bolt and hardened washer.
- b** Ultra Pro Series roller lifters.
- c** Requires Crane Multi Fit valve locks.
- d** Must machine cylinder heads.
- e** Machined steel, heat treated.
- f** Machined steel, heat treated, Multi Fit.

- g** Heavy wall, heat treated, for use with pushrod guideplate cylinder heads.
- h** Pro Series one-piece.
- i** Performance steel billet gears and roller chain set.
- j** Crane Classic extruded, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- k** 1.73 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.
- l** 1.73 ratio Wide Body, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 296

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                           | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh. | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|-----------------------------------|--|---|-------------------------------|---|-----------------------------|-------------------------------|
| <b>Mechanical Roller Camshafts</b>  |                                  |                       |  |                                   |  |   |                               |   |                             |                               |
| Competition only, good upper RPM torque and HP, bracket racing, auto trans w/race converter, 12.5 minimum compression ratio advised.  | R-272/420-251-10                 | 4200-8000             | 358831 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 272  | 304   | 110                           | 30 62   | .020                        | .718                          |
|   |                                  |                       |  |                                   | 280  | 312   |                               | 74 26   | .020                        | .718                          |
| Competition only, good upper RPM torque and HP, bracket racing, good w/540+ cu.in w/aluminum cylinder heads, good with large manifold nitrous system, auto trans w/race converter, 12.5 minimum compression ratio advised. Good with large Roots supercharger, 24 lbs. maximum boost w/8.0 maximum compression ratio advised. | R-272/436-25-14                  | 4200-8200             | 358221 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 272  | 302   | 114                           | 27 65   | .020                        | .746                          |
|   |                                  |                       |  |                                   | 280  | 312   |                               | 79 21   | .022                        | .732                          |
| Competition only, good upper RPM torque and HP, bracket racing, 510+ cu.in., auto trans w/race converter, 12.5 minimum compression ratio advised.   | R-276/420-2-10                   | 4400-8200             | 358841 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 276  | 308   | 110                           | 32 64   | .020                        | .718                          |
|   |                                  |                       |  |                                   | 286  | 318   |                               | 77 29   | .020                        | .718                          |
| Competition only, good upper RPM HP, bracket racing, good w/540+ cu.in w/aluminum cylinder heads, good with large manifold nitrous system, auto trans w/race converter, 13.0 minimum compression ratio advised. SF01 firing order.  | R-276/4334-25-12 SF01            | 4600-8400             | 358231 <sup>a</sup>                        | 30518-16<br>35570-16 <sup>b</sup> | 276  | 316   | 112                           | 29 67   | .026                        | .741                          |
|   |                                  |                       |  |                                   | 286  | 326   |                               | 78 28   | .026                        | .730                          |
| Radical competition only, NMRA, Top Sportsman, large manifold nitrous system, good with 540+ cu.in., auto trans w/race converter, 14.0 minimum compression ratio advised. SF01 firing order.  | R-280/5152-25-14 SF01            | 5000-8800             | 358241 <sup>a</sup>                        | 35570-16 <sup>b</sup>             | 280  | 310   | 114                           | 31 69   | .020                        | .881                          |
|   |                                  |                       |  |                                   | 296  | 336   |                               | 87 29   | .030                        | .805                          |
| Radical competition only, Unlimited Street, Quick 16, Top Sportsman, large manifold nitrous system, very large cu.in., auto trans w/race converter, 14.5 minimum compression ratio advised. SF01 firing order.  | R-288/5152-25-16 SF01            | 5400-9200             | 358251 <sup>a</sup>                        | 35570-16 <sup>b</sup>             | 288  | 318   | 116                           | 33 75   | .020                        | .881                          |
|   |                                  |                       |  |                                   | 310  | 346   |                               | 96 34   | .030                        | .838                          |

CAMSHAFTS

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**IMPORTANT:** Crane offers Pushrod Guideplate and Rocker Arm Stud Conversion Kits, (35655-16 and 52655-16) for street applications, enabling the 370-429-460 cu.in. engines with pedestal mounted rockers to have adjustable rocker arms without cylinder head removal or machining. See page 325 for details.

**NOTE:** Roller camshafts with SF01 firing order (1-5-4-8-6-3-7-2) are available on special order. Contact Crane's Performance Consultants for details.

**NOTE:** When installing roller lifter series cams and kits, in other than 429 Super C.J. engines, a method of effecting valve adjustment is required. On 68-71 engines equipped with bottleneck type studs, using 99768-16 positive locking nuts will permit valve adjustment. On 72-97 engines, the heads must be machined to use 99159-16 screw-in studs and pushrod guideplates.

**NOTE:** Many 1972-97 Ford-Mercury V-8 engines are originally equipped with a retarded crankshaft sprocket. This may cause idling and performance problems when installing aftermarket camshafts. We recommend using our 35975-1 timing chain and gear assembly, a pre-1972 crankshaft sprocket, or by degreasing in your camshaft. The non-retarded sprocket will have the alignment dot and keyway slot directly in line with each other.

**NOTE:** These camshafts also fit the 1969-70 Ford 429 Boss Hemi V-8 engines. Some kit components will differ. Contact Crane's Performance Consultants for details.

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**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337                                       | See pg. 350  | See pg. 362           | See pg. 360                                  | See pg. 306                                    | See pg. 328                    | See pg. 312       | See pg. 315   | See pg. 317                                    |
|--------------------------------|---|--|-----------------------|--|--|--------------------------------|-------------------|---|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                     | RETAINERS  | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE                                      |
|                                | 99885-16  | 99956-16<br>99974-16 <sup>f</sup>                          | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99094-1 <sup>k</sup> | 35621-16 <sup>l</sup><br>95653-16 <sup>m</sup> | 35975-1 <sup>o</sup>           |                   | 27774-16 <sup>p</sup>                               | 27750-16 <sup>q</sup><br>27771-16 <sup>r</sup> |
|                                | 99885-16  | 99956-16<br>99974-16 <sup>f</sup>                          | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99094-1 <sup>k</sup> | 35621-16 <sup>l</sup><br>95653-16 <sup>m</sup> | 35975-1 <sup>o</sup>           |                   | 27774-16 <sup>p</sup>                               | 27750-16 <sup>q</sup><br>27771-16 <sup>r</sup> |
|                                | 99885-16  | 99956-16<br>99974-16 <sup>f</sup>                          | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99094-1 <sup>k</sup> | 35621-16 <sup>l</sup><br>95653-16 <sup>m</sup> | 35975-1 <sup>o</sup>           |                   | 27774-16 <sup>p</sup>                               | 27750-16 <sup>q</sup><br>27771-16 <sup>r</sup> |
|                                | 99885-16<br>961226-16 <sup>c,e</sup>              | 99956-16<br>99974-16 <sup>f</sup><br>99661-16 <sup>g</sup> | 99820-16 <sup>e</sup> | 99097-1 <sup>j</sup><br>99094-1 <sup>k</sup> | 35621-16 <sup>l</sup><br>95653-16 <sup>m</sup> | 35975-1 <sup>o</sup>           |                   | 27774-16 <sup>p</sup>                               | 27750-16 <sup>q</sup><br>27771-16 <sup>r</sup> |
|                                | 96848-16 <sup>d</sup><br>961356-16 <sup>d,e</sup> | 99681-16 <sup>i</sup><br>99663-16 <sup>h</sup>             | 99826-16 <sup>e</sup> | 99097-1 <sup>j</sup>                         | 95810-16 <sup>n</sup>                          |                                |                   |   | 27750-16 <sup>q</sup><br>27771-16 <sup>r</sup> |
|                                | 96848-16 <sup>d</sup><br>961356-16 <sup>d,e</sup> | 99681-16 <sup>i</sup><br>99663-16 <sup>h</sup>             | 99826-16 <sup>e</sup> | 99097-1 <sup>j</sup>                         | 95810-16 <sup>n</sup>                          |                                |                   |   | 27750-16 <sup>q</sup><br>27771-16 <sup>r</sup> |

- a Requires 52970-1 (.500" I.D.) or 52971-1 (.531" I.D.) steel, or 52990-1 (.500" I.D.) or 52989-1 (.531" I.D.) aluminum-bronze distributor drive gear, and 7/16-20 x 1-1/4" grade 8 cam gear bolt and hardened washer.
- b Ultra Pro Series roller lifters.
- c Requires 99661-16 titanium retainers.
- d For 2.100" assembly height, requires 99663-16 titanium retainers.
- e Must machine cylinder heads.
- f Requires Crane Multi Fit valve locks.
- g Titanium, for 961226-16 valve springs, requires Crane Multi Fit valve stem locks.
- h Titanium, for 961356-16 valve springs, requires Crane Multi Fit valve stem locks.
- i Must use 99097-1 valve stem locks, included with the retainers.
- j Machined steel, heat treated.

- k Machined steel, heat treated, Multi Fit.
- l Heavy wall, heat treated, for use with pushrod guideplate cylinder heads.
- m Pro Series one-piece.
- n Pro Series one-piece, 3/8" diameter, special guideplates required.
- o Performance steel billet gears and roller chain set.
- p Crane Classic extruded, 1.72 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve train stabilizer available, see page 363.
- q 1.73 ratio, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve train stabilizer available, see page 363.
- r 1.73 ratio Wide Body, requires 7/16" rocker arm studs and pushrod guideplates. See notes on opposite page. Valve Train Stabilizer available, see page 363.

## COMPLETE CAM SPECIFICATIONS

See pg. 286

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | FOLLOWERS | Degrees<br>Duration<br>@ .050" | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Valve Lift<br>Int/Exh | Lash<br>Cold<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |      |
|---|----------------------------------|-----------------------|--|-----------|--------------------------------|---|-------------------------------|--|------------------------------|-------------------------------|------|
| <b>Mechanical Follower Camshafts</b>  |                                  |                       |  |           |                                |   |                               |  |                              |                               |      |
| Good idle, daily usage, torque upgrade for stock engine, OK with aftermarket intake/exhaust, good for use with supercharger or turbocharger.                        | HON-224/423-VTEC-11              | 2500-<br>8500         | 252-0010*                                  | VTEC:     | 224                            | 258   | 110                           |  | .008                         | .423                          |      |
|   |                                  |                       |  |           | 210                            | 238   |                               |  | .010                         | .386                          |      |
|   |                                  |                       |  |           | PRI:                           | 186   | 214                           | 111  | (15) 21                      | .008                          | .319 |
|   |                                  |                       |  |           | 186                            | 214   |                               | 39 (9)   | .010                         | .319                          |      |
|   |                                  |                       |  |           | SEC:                           | 190   | 218                           | 110  |                              | .008                          | .327 |
|   |                                  |                       |  |           | 190                            | 218   |                               |  | .010                         | .327                          |      |
| Performance usage, radical street, drag race, good upper RPM HP, high flowing cylinder head/intake/large exhaust advised, 12.0+ minimum compression ratio required. | HON-232/443-VTEC-13              | 3000-<br>9000         | 252-0012*                                  | VTEC:     | 232                            | 266   | 112                           |  | .008                         | .443                          |      |
|   |                                  |                       |  |           | 218                            | 246   |                               |  | .010                         | .386                          |      |
|   |                                  |                       |  |           | PRI:                           | 186   | 214                           | 113  | (19) 25                      | .008                          | .319 |
|   |                                  |                       |  |           | 186                            | 214   |                               | 43 (5)   | .010                         | .319                          |      |
|   |                                  |                       |  |           | SEC:                           | 190   | 218                           | 110  |                              | .008                          | .327 |
|   |                                  |                       |  |           | 190                            | 218   |                               |  | .010                         | .327                          |      |
| Stock (for comparison purposes only)  |                                  |                       |  | VTEC:     | 217                            | 247   | 112                           |  |                              | .397                          |      |
|   |                                  |                       |  |           | 204                            | 235   |                               |  |                              | .370                          |      |
|   |                                  |                       |  |           | PRI:                           | 183   | 211                           | 115  |                              |                               | .300 |
|   |                                  |                       |  |           | 183                            | 211   |                               |  |                              | .300                          |      |
|   |                                  |                       |  |           | SEC:                           | 187   | 215                           | 113  |                              |                               | .319 |
|   |                                  |                       |  |           | 187                            | 215   |                               |  |                              | .319                          |      |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.



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**CRANE VALVE TRAIN COMPONENTS**

|                                      |                    |                    |                        |                        |                    |   |                         |   |                    |
|--------------------------------------|--------------------|--------------------|------------------------|------------------------|--------------------|---|-------------------------|---|--------------------|
| <i>See pg. 358</i>                   | <i>See pg. 337</i> | <i>See pg. 350</i> | <i>See pg. 362</i>     | <i>See pg. 360</i>     | <i>See pg. 306</i> | <i>See pg. 328</i>                      | <i>See pg. 312</i>      | <i>See pg. 315</i>                                  | <i>See pg. 317</i> |
| VALVE SPRING<br>AND RETAINER<br>KITS | VALVE<br>SPRINGS   | RETAINERS          | VALVE<br>STEM<br>SEALS | VALVE<br>STEM<br>LOCKS | PUSHRODS           | TIMING BELT<br>AND SPROCKET<br>ASSEMBLY | STEEL<br>ROCKER<br>ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD<br>RACE       |

# MG TC-TD-TF 4 cyl. 40-54

1250cc

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS | Degrees<br>Duration<br>@ .050" | Advertised<br>Degrees<br>Duration | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050" | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|--|----------------------------------|-----------------------|--|---------|--------------------------------|-----------------------------------|-------------------------------|-----------------------|---------------------|-----------------------|
| <b>Mechanical Lifter Camshafts</b>   |                                  |                       |  |         |                                |                                   |                               |                       |                     |                       |
| Replacement for factory 168553 camshaft. This camshaft features oversize lobes to reduce wear. Part number 905-0003 pushrods required, as stock pushrods will be too long. | BluePrinted<br>553-05            | 1000-<br>4500         | 340-0002                                   |         | 190                            | 242                               | 110                           | (15) 25               | .018                | .357                  |
|  |                                  |                       |  |         | 190                            | 242                               |                               | 25 (15)               | .020                | .357                  |
| Good idle, daily usage, also mild supercharged, 2600-3200 cruise RPM, 9.0 to 10.75 compression ratio advised.  | F-222/280-2-10                   | 1800-<br>5200         | 340-0010                                   |         | 222                            | 260                               | 110                           | 6 36                  | .016                | .420                  |
|  |                                  |                       |  |         | 232                            | 270                               |                               | 51 1                  | .018                | .441                  |
| Fair idle, good mid to upper RPM torque and HP, moderate performance usage, road course, hillclimb, 10.5 minimum compression ratio advised.                                | MG-T-3                           | 2400-<br>5800         | 340-0012                                   |         | 234                            | 294                               | 110                           | 12 42                 | .022                | .443                  |
|  |                                  |                       |  |         | 234                            | 294                               |                               | 52 2                  | .024                | .443                  |

CAMSHAFTS

# MGA-MGB 4 cyl. 57-80

1598-1798cc

## Mechanical Lifter Camshafts

|   |                       |               |          |  |     |     |       |            |      |      |
|---|-----------------------|---------------|----------|--|-----|-----|-------|------------|------|------|
| Replacement for factory 88G303 camshaft (1964-80 "2 groove").   | BluePrinted<br>88G303 | 1000-<br>4500 | 342-0002 |  | 199 | 248 | 107.5 | (7.5) 26.5 | .012 | .376 |
|   |                       |               |          |  | 215 | 263 |       | 35.5 (0.5) | .014 | .376 |
| Good idle, daily usage, autocross, also mild supercharged, 2600-3200 cruise RPM, 9.0 to 10.75 compression ratio advised.                    | F-222/280-2-10        | 1800-<br>5200 | 342-0010 |  | 222 | 260 | 110   | 6 36       | .014 | .399 |
|   |                       |               |          |  | 232 | 270 |       | 51 1       | .016 | .419 |
| Fair idle, good mid to upper RPM torque and HP, moderate performance usage, road course, hillclimb, 10.5 minimum compression ratio advised. | F-232/294-8           | 2400-<br>5800 | 342-0012 |  | 232 | 270 | 108   | 13 39      | .016 | .419 |
|   |                       |               |          |  | 232 | 270 |       | 49 3       | .018 | .419 |
| Competition only, good upper RPM HP, road course, 12.0 minimum compression ratio advised.   | F-260/338-6           | 4000-<br>7500 | 342-0107 |  | 260 | 312 | 106   | 28 52      | .028 | .482 |
|   |                       |               |          |  | 260 | 312 |       | 60 20      | .030 | .482 |

# MG Midget—Mini—Sprite 4 cyl. 57-84

BMCA 848-1275cc

## Mechanical Lifter Camshafts

|   |                  |               |          |  |     |     |     |       |      |      |
|---|------------------|---------------|----------|--|-----|-----|-----|-------|------|------|
| Good idle, daily usage, autocross, also mild turbocharged, 2600-3200 cruise RPM, 9.0 to 10.5 compression ratio advised.                   | F-222/280-2-10   | 1800-<br>5200 | 344-0010 |  | 222 | 260 | 110 | 6 36  | .012 | .353 |
|   |                  |               |          |  | 232 | 270 |     | 51 1  | .014 | .370 |
| Fair idle, good mid to upper RPM torque and HP, moderate performance usage, autocross, hillclimb, 10.0 minimum compression ratio advised. | F-232/294-2-10   | 2200-<br>5600 | 344-0012 |  | 232 | 270 | 110 | 11 41 | .012 | .370 |
|   |                  |               |          |  | 242 | 280 |     | 56 6  | .014 | .388 |
| Competition only, good upper RPM HP, road course, 12.0 minimum compression ratio advised.   | F-256/3526-2S-02 | 4500-<br>8000 | 344-0102 |  | 256 | 290 | 102 | 26 50 | .020 | .444 |
|   |                  |               |          |  | 266 | 300 |     | 55 31 | .020 | .449 |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

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**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i> | <i>See pg. 350</i> | <i>See pg. 362</i> | <i>See pg. 360</i> | <i>See pg. 306</i> | <i>See pg. 328</i>             | <i>See pg. 312</i> | <i>See pg. 315</i>                                  | <i>See pg. 317</i> |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------------------|--------------------|---|--------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS      | RETAINERS          | VALVE STEM SEALS   | VALVE STEM LOCKS   | PUSHRODS           | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE          |

905-0003

905-0003

905-0003

99884-8      99967-8      905-0004

99884-8      99967-8      905-0004

99884-8      99967-8      905-0004

99884-8      99967-8      905-0004

# Mitsubishi 4G63/4G63-T 4 cyl. Eclipse-Talon-Gallant 1989-1999

DOHC 4V 2.0 Litre

## COMPLETE CAM SPECIFICATIONS

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | See pg. 286<br>FOLLOWERS | Degrees             | Advertised          | Degrees            | Open/Close            | Lash        | Gross        |
|--|----------------------------------|-----------------------|--|--------------------------|---------------------|---------------------|--------------------|-----------------------|-------------|--------------|
|  |                                  |                       |  |                          | Duration<br>@ .050" | Degrees<br>Duration | Lobe<br>Separation | @ .050"<br>Valve Lift | Hot<br>Int. | Lift<br>Int. |
| Good idle, daily usage, performance upgrade for stock engine, aftermarket intake/exhaust and ECM advised, new valve springs recommended.   | MIT-248-2SR-10                   | 800-<br>6500          | 435-0010*                                  |                          | 208                 | 248                 | 110                | (1.5) 29.5            | .000        | .404         |
|  |                                  |                       |  |                          | 200                 | 240                 |                    | 34.5 (14.5)           | .000        | .384         |
| Good idle, performance usage, street, drag race, OK with nitrous, aftermarket intake/exhaust and ECM advised, requires upgraded valve springs and retainers, valve guides must be shortened.   | MIT-256-2SR-10                   | 1200-<br>6800         | 435-0012*                                  |                          | 216                 | 256                 | 110                | 4.5 31.5              | .000        | .424         |
|  |                                  |                       |  |                          | 208                 | 248                 |                    | 40.5 (12.5)           | .000        | .404         |
| Fair idle, performance usage, for use with aftermarket turbo systems, intercooler advised, aftermarket intake/low restriction exhaust and ECM required, requires upgraded valve springs and retainers, valve guides must be shortened. | MIT-264-2SR-10                   | 1500-<br>7500         | 435-0014*                                  |                          | 224                 | 264                 | 110                | 10.5 33.5             | .000        | .443         |
|  |                                  |                       |  |                          | 216                 | 256                 |                    | 46.5 (10.5)           | .000        | .424         |
| Stock (for comparison purposes only)   |                                  |                       |  |                          | 193                 | 240                 | 106.5              |                       |             | .335         |
|  |                                  |                       |  |                          | 193                 | 240                 |                    |                       |             | .335         |

CAMSHAFTS

# Mitsubishi 420A 4 cyl. Eclipse non-Turbo 1995-1999

DOHC 4V 2.0 Litre

## Hydraulic Roller Follower Camshafts

|   |               |               |           |  |     |     |     |         |      |      |
|---|---------------|---------------|-----------|--|-----|-----|-----|---------|------|------|
| Good idle, daily usage, performance upgrade for stock engine, aftermarket intake/exhaust and ECM advised, new valve springs recommended.                | MIT-242-8     | 800-<br>6500  | 431-0010* |  | 200 | 242 | 108 | (5) 26  | .000 | .354 |
|   |               |               |           |  | 200 | 242 |     | 31 (11) | .000 | .354 |
| Good idle, performance usage, street, drag race, intended for use with nitrous, aftermarket intake/exhaust and ECM advised.                             | MIT-246-10    | 1200-<br>6800 | 431-0012* |  | 204 | 246 | 110 | (5) 29  | .000 | .364 |
|   |               |               |           |  | 204 | 246 |     | 35 (11) | .000 | .364 |
| Fair idle, performance usage, for use with aftermarket turbo systems, intercooler advised, aftermarket intake/low restriction exhaust and ECM required. | MIT-246-2SR-8 | 1500-<br>6800 | 431-0014* |  | 204 | 246 | 108 | (3) 27  | .000 | .364 |
|   |               |               |           |  | 196 | 238 |     | 29 (13) | .000 | .344 |
| Fair idle, moderate performance usage, drag race, good mid and upper RPM HP, high flowing cylinder head/intake/exhaust advised.                         | MIT-250-8     | 2000-<br>7200 | 431-0016* |  | 208 | 250 | 108 | 0 28    | .000 | .374 |
|   |               |               |           |  | 208 | 250 |     | 36 (8)  | .000 | .374 |
| Performance usage, drag race, good upper RPM HP, high flowing cylinder head/intake/large exhaust advised, 12.0+ minimum compression ratio required.     | MIT-258-10    | 2500-<br>7500 | 431-0018* |  | 216 | 258 | 110 | 2 34    | .000 | .394 |
|   |               |               |           |  | 216 | 258 |     | 42 (6)  | .000 | .394 |
| Stock (for comparison purposes only)  |               |               |           |  | 192 | 243 | 109 |         |      | .344 |
|   |               |               |           |  | 196 | 243 |     |         |      | .315 |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application. The 4G63 camshafts are suitable for both GEN 1 and GEN 2 engines.

Chrysler Neon 2.0L camshafts will not function properly in the 420A engines, as the cam lobe layout and cam sensor locations are different.

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**CRANE VALVE TRAIN COMPONENTS**

|                                |                    |                    |                    |                    |                    |                                   |                    |   |                    |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-----------------------------------|--------------------|---|--------------------|
| <i>See pg. 358</i>             | <i>See pg. 337</i> | <i>See pg. 350</i> | <i>See pg. 362</i> | <i>See pg. 360</i> | <i>See pg. 306</i> | <i>See pg. 328</i>                | <i>See pg. 312</i> | <i>See pg. 315</i>                                  | <i>See pg. 317</i> |
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS      | RETAINERS          | VALVE STEM SEALS   | VALVE STEM LOCKS   | PUSHRODS           | TIMING BELT AND SPROCKET ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE          |



### COMPLETE CAM SPECIFICATIONS

| Application  | Camshaft Series/<br>Grind Number       | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | See pg. 286<br>FOLLOWERS | Degrees             | Advertised          | Degrees            | Open/Close                       | Lash        | Gross        |
|--|--|-----------------------|--|--------------------------|---------------------|---------------------|--------------------|----------------------------------|-------------|--------------|
|  |  |                       |  |                          | Duration<br>@ .050" | Degrees<br>Duration | Lobe<br>Separation | @ .050"<br>Valve Lift<br>Int/Exh | Hot<br>Int. | Lift<br>Int. |
| <b>Hydraulic Roller Follower Camshafts</b>   |  |                       |  |                          |                     |                     |                    |                                  |             |              |
| Good idle, daily usage, performance upgrade for stock engine, aftermarket intake/exhaust and ECM advised, new valve springs and retainers recommended.   | MIT-248-2SR-10                         | 800-<br>6500          | 440-0010*                                  |                          | 208                 | 248                 | 110                | (7.5) 35.5                       | .000        | .404         |
|  |  |                       |  |                          | 200                 | 240                 |                    | 28.5 (8.5)                       | .000        | .384         |
| Good idle, performance usage, street, drag race, OK with nitrous, aftermarket intake/exhaust and ECM advised, requires upgraded valve springs and retainers, valve guides must be shortened.   | MIT-256-2SR-10                         | 1200-<br>6800         | 440-0012*                                  |                          | 216                 | 256                 | 110                | (3.5) 39.5                       | .000        | .424         |
|  |  |                       |  |                          | 208                 | 248                 |                    | 32.5 (4.5)                       | .000        | .404         |
| Fair idle, performance usage, for use with aftermarket turbo systems, intercooler advised, aftermarket intake/low restriction exhaust and ECM required, requires upgraded valve springs and retainers, valve guides must be shortened. | MIT-264-2SR-10                         | 1500-<br>7500         | 440-0014*                                  |                          | 224                 | 264                 | 110                | (0.5) 43.5                       | .000        | .444         |
|  |  |                       |  |                          | 216                 | 256                 |                    | 36.5 (0.5)                       | .000        | .424         |
|  | HKS 264 (for comparison purposes only) |                       |  |                          | 200                 | 264                 |                    |                                  |             | .425         |
|  |  |                       |  |                          | 200                 | 264                 |                    |                                  |             | .402         |
|  | HKS 272 (for comparison purposes only) |                       |  |                          | 208                 | 272                 |                    |                                  |             | .425         |
|  |  |                       |  |                          | 208                 | 272                 |                    |                                  |             | .402         |
|  | HKS 280 (for comparison purposes only) |                       |  |                          | 216                 | 280                 |                    |                                  |             | .425         |
|  |  |                       |  |                          | 216                 | 280                 |                    |                                  |             | .402         |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

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**CRANE VALVE TRAIN COMPONENTS**

|                                      |                    |                    |                        |                        |                    |   |                         |   |                    |
|--------------------------------------|--------------------|--------------------|------------------------|------------------------|--------------------|---|-------------------------|---|--------------------|
| <i>See pg. 358</i>                   | <i>See pg. 337</i> | <i>See pg. 350</i> | <i>See pg. 362</i>     | <i>See pg. 360</i>     | <i>See pg. 306</i> | <i>See pg. 328</i>                      | <i>See pg. 312</i>      | <i>See pg. 315</i>                                  | <i>See pg. 317</i> |
| VALVE SPRING<br>AND RETAINER<br>KITS | VALVE<br>SPRINGS   | RETAINERS          | VALVE<br>STEM<br>SEALS | VALVE<br>STEM<br>LOCKS | PUSHRODS           | TIMING BELT<br>AND SPROCKET<br>ASSEMBLY | STEEL<br>ROCKER<br>ARMS | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD<br>RACE       |



# Oldsmobile and Pontiac V8 Tech Tips & Notes

**Oldsmobile V8 1967-1984 260-307 (5.0L) – 350 (5.7L) – 400-403-425-455 cu.in.**

This popular Oldsmobile V8 engine family actually began in 1964, as a 330 cu.in. version. There are no “small block” or “big block” Olds V8’s in this series, as the same basic engine architecture is used from the 260 to the 455 versions. Two different deck heights were used, depending upon displacement.

There were a number of changes from 1964 to 1967 that can complicate obtaining the correct camshaft and lifters, due to differing lifter bank angles and lifter diameters. The chart below will explain these by year and displacement. The 45 and 39 degree lifter bank angle camshafts will physically interchange, but the improper application will cause incorrect valve timing from bank to bank. To be certain that you have the proper camshaft in your block, check the cam timing on each bank of the engine. A cranking compression test will also be an indication, especially if one side varies consistently from the other. Our 79-prefix designates the 45 degree bank angle camshafts (available on special order), while the 80-prefix is for the more common 39-degree bank angle applications. All of these engines have inline lifter bores and are equipped with 1.6:1 ratio non-adjustable rocker arms.

1966-1967 400 cu.in. and 425 cu.in. Toronado engines had .921” diameter lifters, while the others had .842” diameter hydraulic lifters. The .921” lifters can be difficult to obtain, and many folks will sleeve their lifter bores so that the .842” items can be used.

We offer complete lines of hydraulic, retrofit hydraulic roller, mechanical, and roller lifter camshafts and valve train components for these engines.

The carburized steel retrofit hydraulic roller and street roll-

er camshafts are equipped with a cast iron distributor drive gear and rear journal. These are noted by an IG suffix (Iron Gear), allowing the use of a standard type distributor gear for long term reliability.

There were also 260D and 350D cu.in. Diesel versions offered from 1978 to 1985, featuring more robust block and head castings. These engines had 39 degree bank angle camshafts and .842” flat faced lifters, with the exception of a few very early blocks intended for racing that were bored for .921” lifters.

From 1985 to 1990, this engine family continued with a 307 cu.in. powerplant, equipped with a 39 degree bank angle hydraulic roller camshaft and .921” diameter hydraulic roller lifters. Our 80-prefix camshafts can be used in these engines if a thrust spacer is fabricated, and the appropriate lifters are used.

The production cylinder heads can be machined for screw-in rocker arm studs and pushrod guideplates, permitting adjustable stud mounted rocker arms to be installed. Heat treated pushrods will be required for guideplate compatibility. This will provide more accurate lifter preload adjustment for hydraulic lifter applications, and are necessary to achieve lash adjustment for mechanical and roller lifter equipped engines. A number of aftermarket cylinder heads have been offered over the years, in iron and aluminum versions, with most of them having provisions for adjustable rockers already incorporated.

In the late 70’s and early 80’s, General Motors interchanged engines throughout the product offerings. Pontiacs could have Oldsmobile engines, Buicks with Chevy engines, etc. Make sure of exactly what engine you have before proceeding with your service or modifications.

CAMSHAFTS

**Much confusion has arisen from ordering the wrong cam, lifters and pushrods for the 64-84 Olds engines. The following table should be used to avoid error when placing your order.**

| Year  | Cu. In. | Model             | Lifter Dia. | Cam Bank Angle | Order Cam w/ Part No. beginning with | Hydraulic Cam Lifters | Mechanical Cam Lifters | Hydraulic Lifter Cam Pushrods |
|-------|---------|-------------------|-------------|----------------|--------------------------------------|-----------------------|------------------------|-------------------------------|
| 64    | 330     | ALL               | .842        | 45°            | 79-                                  | 99284-16*             | 99250-16               | 95647-16                      |
| 65    | 330     | ALL               | .842        | 45°            | 79-                                  | 99284-16*             | 99250-16               | 95647-16                      |
| 65    | 400     | ALL               | .842        | 45°            | 79-                                  | 99284-16*             | 99250-16               |                               |
| 65    | 425     | ALL               | .842        | 45°            | 79-                                  | 99284-16*             | 99250-16               |                               |
| 66    | 330     | ALL               | .842        | 45°            | 79-                                  | 99284-16*             | 99250-16               | 95647-16                      |
| 66    | 400     | ALL               | .921        | 39°            | 80-                                  |                       |                        |                               |
| 66    | 425     | ALL exc. Toronado | .842        | 45°            | 79-                                  | 99284-16*             | 99250-16               |                               |
| 66    | 425     | Toronado Only     | .921        | 39°            | 80-                                  |                       |                        |                               |
| 67    | 330     | ALL               | .842        | 45°            | 79-                                  | 99284-16*             | 99250-16               | 95647-16                      |
| 67    | 400     | ALL               | .921        | 39°            | 80-                                  |                       |                        | 95647-16                      |
| 67    | 425     | ALL exc. Toronado | .842        | 39°            | 80-                                  | 99284-16*             | 99250-16               |                               |
| 67    | 425     | Toronado Only     | .921        | 39°            | 80-                                  |                       |                        | 95647-16                      |
| 68-69 | 400     | ALL               | .842        | 39°            | 80-                                  | 99284-16*             | 99250-16               |                               |
| 68-80 | 350     | ALL               | .842        | 39°            | 80-                                  | 99284-16*             | 99250-16               | 95647-16                      |
| 68-76 | 455     | ALL               | .842        | 39°            | 80-                                  | 99284-16*             | 99250-16               |                               |
| 75-82 | 260     | ALL               | .842        | 39°            | 80-                                  | 99284-16*             | 99250-16               | 95647-16                      |
| 77-79 | 403     | ALL               | .842        | 39°            | 80-                                  | 99284-16*             | 99250-16               | 95647-16                      |
| 80-84 | 307     | ALL               | .842        | 39°            | 80-                                  | 99284-16*             | 99250-16               | 95647-16                      |

\*Optional Hi Intensity hydraulic lifters (99384-16\*) are available, see page 292 for details



### **Oldsmobile DRCE V8**

The DRCE (Drag Racing Corporate Engine) offered by Olds consisted of a block and cylinder heads based on big block Chevrolet dimensioning. The DRCE and DRCE2 engines were never vehicle installed, nor were they offered as an engine assembly. Directed towards Pro Stock racing, many improvements were made over the Chevy, with these components offered as basic building blocks for the particular engine builder. Different lifter bore angles and camshaft journal diameters were used, so if you obtain one of these engines, be certain of exactly what dimensioned version you have when requiring parts.

Crane offers custom ground camshafts and other components for the DRCE series of engines. Please contact us directly for your specific requirements.

**Pontiac V8 1955-1981 265 (4.3L) – 287 301 (4.9L) – 316-326-347-350-370-389-400 (6.6L) – 421-428-455 cu.in.**

The fabled Pontiac V8 family is also based on a common dimensioned foundation. There are no “small block” or “big block” versions. The exceptions that might be noted are the 1977-81 265 and 301 cu.in. lightweight engines, that require the use of Chevrolet lifters due to relocated oil galleries, and also have a different deck height (the cylinder heads and many other internal parts were also unique).

These engines are designated by our 28-prefix. The blocks have inline lifter bores with .842” diameter lifters. The standard rocker arm ratio is 1.5:1, with the exception of the 1959-63 Super Duty engines (cylinder head casting numbers 540306, 544127, and 9771980) that were equipped with 1.65:1 ratio rockers.

We offer complete lines of hydraulic, retrofit hydraulic roller, mechanical, and roller lifter camshafts and components for these engines. The carburized steel retrofit hydraulic roller and street roller camshafts are equipped with a cast iron distributor drive gear and rear journal. These are noted by an IG suffix (Iron Gear), allowing the use of a standard type distributor gear for long term reliability.

The same camshafts are applicable to nearly all of these engines. One unique exception occurred in the 1973-74 455 Super Duty, which had an undersize distributor drive gear on the camshaft, and an oversize gear on the distributor. A standard configuration camshaft can be installed in these engines, as long as a standard gear is also installed on the distributor. We did produce some of the small gear camshafts during that era, and they were designated by an “SD” suffix after the grind number.

There was also a totally unique 1969 “Race Only” Ram Air V engine with tunnel port heads that incorporated a different valve layout, requiring a special camshaft. If you are fortunate to have one of these rare engines, we can custom manufacture a steel billet roller camshaft for it.

There are also aftermarket cylinder blocks being offered today, which have options of different diameter cam bearing journals. We can also produce special steel billet roller camshafts for these applications.

Although the Pontiac V8 engines had stud mounted stamped steel rocker arms with pivot balls, there were a number of variations. There were a few exceptions for special versions, but the basics are as follows: The 1955 engines had straight 3/8” studs, with a crimped locking nut used for adjustment. The 1956-60 engines had bottleneck 3/8” studs, with a 5/16” threaded top section. The nuts were torqued against the step, and were non-adjustable. The 1961-81 engines had bottleneck 7/16” studs, with a 3/8” threaded top section, and were again non-adjustable. There were Super Duty heads equipped with straight 7/16” studs, having an adjustable configuration. The bottleneck versions can be made adjustable with the appropriate sized positive locking adjusting nuts, providing the most accurate adjustment for hydraulic camshafts, and are a necessity for mechanical lifter camshafts. Today’s aftermarket aluminum cylinder heads have straight studs intended for an adjustable rocker configuration. We offer 1.5:1 and 1.65:1 ratio rocker arms for most popular combinations.

In the late 70’s and early 80’s, General Motors interchanged engines throughout the product offerings. Pontiacs could have Oldsmobile engines, Buicks with Chevy engines, etc. Make sure of exactly what engine you have before proceeding with your service or modifications.

### COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code  | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|---|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>   |                                  |                       |   |  |  |   |                               |  |                             |                               |
| Brute low end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.   | <b>H-192/2667-2S-10</b>          | 800-4200              | <b>800501*</b>                              | <b>99284-16<sup>b</sup></b>                                | 192<br>204                                 | 248<br>260                                    | 110                           | (9) 21<br>37 (13)                            | .000<br>.000                | .427<br>.456                  |
|   |                                  |                       | ❖   |  |  |   |                               |  |                             |                               |
| Good low end torque, smooth idle, daily usage, off road, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.                                       | <b>H-260-2</b>                   | 1200-4800             | <b>803901*</b><br><b>803902<sup>a</sup></b> | <b>99284-16<sup>b</sup></b>                                | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>45 (9)                             | .000<br>.000                | .456<br>.484                  |
|   |                                  |                       | ❖   |  |  |   |                               |  |                             |                               |
| Good low and mid range torque, good idle, daily usage, off road, towing, mild marine, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.                | <b>H-272-2</b>                   | 1600-5400             | <b>804541*</b><br><b>804542<sup>a</sup></b> | <b>99284-16<sup>b</sup></b>                                | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000                | .484<br>.512                  |
|   |                                  |                       | ❖   |  |  |   |                               |  |                             |                               |
| Good mid range torque and HP, fair idle, moderate performance usage, marine perf, bracket racing, auto trans w/2500+ converter, 3200-3600 cruise RPM, 9.5 to 11.0 compression ratio advised.        | <b>H-284-2</b>                   | 2200-5800             | <b>804551*</b><br><b>804552<sup>a</sup></b> | <b>99284-16<sup>b</sup></b><br><b>99384-16<sup>c</sup></b> | 222<br>230                                 | 284<br>292                                    | 110                           | 6 36<br>50 0                                 | .000<br>.000                | .480<br>.496                  |
|   |                                  |                       | ❖   |  |  |   |                               |  |                             |                               |
| Good mid range HP, fair idle, moderate performance usage, bracket racing, auto trans w/3000+ converter, 3600-4000 cruise RPM, 10.0 to 11.5 compression ratio advised.                               | <b>H-292-2</b>                   | 2800-6400             | <b>804461*</b>                              | <b>99284-16<sup>b</sup></b><br><b>99384-16<sup>c</sup></b> | 230<br>234                                 | 292<br>296                                    | 110                           | 10 40<br>52 2                                | .000<br>.000                | .496<br>.504                  |
|   |                                  |                       | ❖   |  |  |   |                               |  |                             |                               |
| Replacement for factory W-31 camshaft (advancing this camshaft 5 degrees will produce the equivalent specs of the 397328 W-30 camshaft).  | <b>402194</b>                    | 2600-6000             | <b>800101</b>                               | <b>99284-16<sup>b</sup></b><br><b>99384-16<sup>c</sup></b> | 232<br>232                                 | 300<br>300                                    | 113.5                         | 3 49<br>49 3                                 | .000<br>.000                | .474<br>.474                  |
|   |                                  |                       | ❖   |  |  |   |                               |  |                             |                               |
| Good mid and upper RPM torque and HP, fair idle, performance usage, best in 425+ cu.in., bracket racing, auto trans w/3500+ converter, 10.5 to 12.0 compression ratio advised.                      | <b>H-234/325-2-10</b>            | 2800-6400             | <b>800601*</b>                              | <b>99284-16<sup>b</sup></b><br><b>99384-16<sup>c</sup></b> | 234<br>244                                 | 304<br>314                                    | 110                           | 12 42<br>57 7                                | .000<br>.000                | .520<br>.542                  |
|   |                                  |                       | ❖   |  |  |   |                               |  |                             |                               |
| Good mid and upper RPM torque and HP, rough idle, performance usage, best in 455+ cu.in., bracket racing, auto trans w/3500+ converter, 10.5 to 12.0 compression ratio advised.                     | <b>H-238/3347-2-10</b>           | 3000-6600             | <b>800661*</b>                              | <b>99284-16<sup>b</sup></b><br><b>99384-16<sup>c</sup></b> | 238<br>248                                 | 294<br>304                                    | 110                           | 14 44<br>59 9                                | .000<br>.000                | .536<br>.560                  |
|   |                                  |                       | ❖   |  |  |   |                               |  |                             |                               |
| Good mid and upper RPM torque and HP, rough idle, performance usage, best in 455+ cu.in. with aluminum heads, bracket racing, auto trans w/3500+ converter, 11.0 to 12.5 compression ratio advised. | <b>H-244/3439-2S-10</b>          | 3200-6800             | <b>800741*</b>                              | <b>99284-16<sup>b</sup></b><br><b>99384-16<sup>c</sup></b> | 244<br>256                                 | 300<br>312                                    | 110                           | 17 47<br>63 13                               | .000<br>.000                | .550<br>.560                  |
|   |                                  |                       | ❖   |  |  |   |                               |  |                             |                               |
| Good upper RPM and HP, rough idle, performance usage, best in 455+ cu.in. with aluminum heads, bracket racing, auto trans w/3800+ converter, 11.5 minimum compression ratio advised.                | <b>H-248/3500-2S-12</b>          | 3400-6800             | <b>800681*</b>                              | <b>99284-16<sup>b</sup></b><br><b>99384-16<sup>c</sup></b> | 248<br>256                                 | 304<br>312                                    | 112                           | 17 51<br>65 11                               | .000<br>.000                | .560<br>.560                  |
|   |                                  |                       | ❖   |  |  |   |                               |  |                             |                               |

Much confusion has arisen from ordering the wrong cam, lifters and pushrods for the 64-84 Olds engines. See the chart on page 270 for IMPORTANT INFORMATION.

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Refer to the chart on page 270 to determine which bank angle engine you have.

**NOTE:** Camshafts for the 45° bank angle engines (79-prefix) are available on special order.

**IMPORTANT:** Check your hydraulic lifter preload, with your original pushrods, to first determine if different pushrods may be required. Refer to page 374 for the fast and easy way to check hydraulic lifter preload. If your hydraulic lifter preload is excessive, this can be easily remedied by using Crane's Rocker Arm Bridge Shim Kit (99179-1). Refer to page 324 for details.

**NOTE:** 1985-1990 307 cu.in. engines are 39° bank angle and are equipped with hydraulic roller camshafts and lifters. Lifter diameter is .921". Conventional hydraulic, mechanical, or roller camshafts and lifters can be installed in these engines if a thrust spacer is fabricated and the appropriate kit components are used.

Since 1975 General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350 | See pg. 362           | See pg. 360          | See pg. 306 | See pg. 328                    | See pg. 312           | See pg. 315                                    | See pg. 317           |
|--------------------------------|-----------------------|-------------|-----------------------|----------------------|-------------|--------------------------------|-----------------------|--|-----------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS   | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS    | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS     | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE   |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                       | 99097-1 <sup>d</sup> | g           | 80975-1 <sup>h</sup>           | 80800-16 <sup>i</sup> | 28774-16 <sup>j</sup><br>80744-16 <sup>k</sup> | 80757-16 <sup>l</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                       | 99097-1 <sup>d</sup> | g           | 80975-1 <sup>h</sup>           | 80800-16 <sup>i</sup> | 28774-16 <sup>j</sup><br>80744-16 <sup>k</sup> | 80757-16 <sup>l</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                       | 99097-1 <sup>d</sup> | g           | 80975-1 <sup>h</sup>           | 80800-16 <sup>i</sup> | 28774-16 <sup>j</sup><br>80744-16 <sup>k</sup> | 80757-16 <sup>l</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                       | 99097-1 <sup>f</sup> | g           | 80975-1 <sup>h</sup>           | 80800-16 <sup>i</sup> | 28774-16 <sup>j</sup><br>80744-16 <sup>k</sup> | 80757-16 <sup>l</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                       | 99097-1 <sup>f</sup> | g           | 80975-1 <sup>h</sup>           | 80800-16 <sup>i</sup> | 28774-16 <sup>j</sup><br>80744-16 <sup>k</sup> | 80757-16 <sup>l</sup> |
| 36308-1 <sup>d</sup>           | 96803-16 <sup>d</sup> | 99946-16    |                       | 99097-1 <sup>f</sup> | g           | 80975-1 <sup>h</sup>           | 80800-16 <sup>i</sup> | 28774-16 <sup>j</sup><br>80744-16 <sup>k</sup> | 80757-16 <sup>l</sup> |
| 11310-1                        | 99838-16              | 99944-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>f</sup> | g           | 80975-1 <sup>h</sup>           | 80800-16 <sup>i</sup> | 28774-16 <sup>j</sup><br>80744-16 <sup>k</sup> | 80757-16 <sup>l</sup> |
| 11310-1                        | 99838-16              | 99944-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>f</sup> | g           | 80975-1 <sup>h</sup>           | 80800-16 <sup>i</sup> | 28774-16 <sup>j</sup><br>80744-16 <sup>k</sup> | 80757-16 <sup>l</sup> |
| 11310-1                        | 99838-16              | 99944-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>f</sup> | g           | 80975-1 <sup>h</sup>           | 80800-16 <sup>i</sup> | 28774-16 <sup>j</sup><br>80744-16 <sup>k</sup> | 80757-16 <sup>l</sup> |
| 11310-1                        | 99838-16              | 99944-16    | 99820-16 <sup>e</sup> | 99097-1 <sup>f</sup> | g           | 80975-1 <sup>h</sup>           | 80800-16 <sup>i</sup> | 28774-16 <sup>j</sup><br>80744-16 <sup>k</sup> | 80757-16 <sup>l</sup> |

- a Cam and lifter kit, includes installation lubricants and Rocker Arm Pedestal Shim Kit.
- b Refer to chart on pages 270 for correct application, may require appropriate Crane pushrods, see IMPORTANT NOTE on opposite page.
- c Optional Hi Intensity hydraulic lifters, see page 292 for details. Refer to chart on page 270 for correct applications, may require appropriate Crane pushrods.
- d Standard diameter valve springs, no machining required.
- e Must machine cylinder heads.
- f Machined steel, heat treated.
- g Refer to chart on page 270 for correct application.
- h Performance steel billet gears and roller chain set.
- i 1.6 ratio, stamped steel, with individual fulcrums and bridge straps, fits 67-79 engines.
- j Crane Classic extruded, 1.65 ratio, 7/16" stud, must machine cylinder heads and install **99157-16** rocker arm studs and aftermarket pushrod guideplates. Special heat treated pushrods are required for use with pushrod guideplates.
- k EnergiZER, 1.65 ratio, 3/8" stud, must machine cylinder heads and install **99156-16** rocker arm studs and aftermarket pushrod guideplates. Special heat treated pushrods are required for use with pushrod guideplates.
- l 1.6 ratio, 7/16" stud, must machine cylinder heads and install **99157-16** rocker arm studs and aftermarket pushrod guideplates. Special heat treated pushrods are required for use with pushrod guideplates.

### COMPLETE CAM SPECIFICATIONS

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | See pg. 294<br>LIFTERS | Degrees             | Advertised          | Degrees            | Open/Close          | Lash        | Gross        |
|---|----------------------------------|-----------------------|--|------------------------|---------------------|---------------------|--------------------|---------------------|-------------|--------------|
|   |                                  |                       |  |                        | Duration<br>@ .050" | Degrees<br>Duration | Lobe<br>Separation | @ .050"<br>Cam Lift | Hot<br>Int. | Lift<br>Int. |
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |                                  |                       |  |                        |                     |                     |                    |                     |             |              |
| Excellent low end torque, good idle, daily usage, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.  | HR-214/325-2S-12 IG              | 1400-5600             | 809611 <sup>a</sup>                        | 28532-16 <sup>c</sup>  | 214                 | 276                 | 112                | 0 34                | .000        | .520         |
|   |                                  |                       |  |                        | 222                 | 284                 |                    | 48 (6)              | .000        | .542         |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3000-3600 cruise RPM, 9.5 to 10.75 compression ratio advised.   | HR-222/339-2S-12 IG              | 1800-6000             | 809621 <sup>a</sup>                        | 28532-16 <sup>c</sup>  | 222                 | 284                 | 112                | 4 38                | .000        | .542         |
|   |                                  |                       |  |                        | 230                 | 292                 |                    | 52 (2)              | .000        | .563         |
| Good mid range torque and HP, fair idle, performance usage, best in 400+ cu.in., mild bracket racing, auto trans w/3000+ converter, good w/plate nitrous system, 3600-4200 cruise RPM, 10.0 to 11.5 compression ratio advised.  | HR-230/352-2S-14 IG              | 2200-6400             | 809631 <sup>a</sup>                        | 28532-16 <sup>c</sup>  | 230                 | 292                 | 114                | 6 44                | .000        | .563         |
|   |                                  |                       |  |                        | 242                 | 304                 |                    | 60 2                | .000        | .595         |
| Good mid range and upper RPM torque and HP, rough idle, performance usage, bracket racing, best in 455+ cu.in., auto trans w/3500+ converter, good w/manifold nitrous system, 4200-5000 cruise RPM, good with aluminum heads, 10.5 to 12.0 compression ratio advised. | HR-242/372-2S-14 IG              | 3000-6800             | 809641 <sup>a</sup>                        | 28532-16 <sup>c</sup>  | 242                 | 304                 | 114                | 12 50               | .000        | .595         |
|   |                                  |                       |  |                        | 254                 | 316                 |                    | 66 8                | .000        | .595         |
| <b>Mechanical Lifter Camshafts</b>  |                                  |                       |  |                        |                     |                     |                    |                     |             |              |
| Good low and mid range torque and HP, fair idle, moderate performance usage, bracket racing, auto trans w/2000+ converter, 3400-3800 cruise RPM, 10.0 to 11.5 compression ratio advised.  | F-238/3200-2-10                  | 2800-6600             | 801181 <sup>b</sup>                        | 99250-16 <sup>d</sup>  | 238                 | 300                 | 110                | 14 44               | .022        | .512         |
|   |                                  |                       |  |                        | 248                 | 310                 |                    | 58 9                | .022        | .533         |
| Good mid range torque and HP, rough idle, moderate performance usage, bracket racing, best in 400+ cu.in., auto trans w/2500+ converter, 3800-4200 cruise RPM, 11.0 to 12.0 compression ratio advised.  | F-248/3334-2-8                   | 3600-7400             | 801231 <sup>b</sup>                        | 99250-16 <sup>d</sup>  | 248                 | 310                 | 108                | 21 47               | .022        | .533         |
|   |                                  |                       |  |                        | 258                 | 320                 |                    | 62 16               | .022        | .555         |
| <b>Mechanical Roller Camshafts</b>  |                                  |                       |  |                        |                     |                     |                    |                     |             |              |
| Good mid range torque and HP, rough idle, performance usage, good low and mid range torque and HP, bracket racing, auto trans w/race converter, 11.0 to 12.5 compression ratio advised.   | R-252/420-2-8                    | 3200-7400             | 808801 <sup>b</sup>                        | 28570-16 <sup>e</sup>  | 252                 | 284                 | 108                | 22 50               | .020        | .672         |
|   |                                  |                       |  |                        | 262                 | 294                 |                    | 63 19               | .020        | .672         |
| Good mid to upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/race converter, good w/plate nitrous system, 11.5 minimum compression ratio advised.   | R-262/420-2-10                   | 3600-7600             | 808811 <sup>b</sup>                        | 28570-16 <sup>e</sup>  | 262                 | 294                 | 110                | 25 57               | .020        | .672         |
|   |                                  |                       |  |                        | 272                 | 304                 |                    | 70 22               | .020        | .672         |
| Good upper RPM torque and HP, competition only, good mid to upper RPM torque and HP, bracket racing, auto trans w/race converter, good w/manifold nitrous system. 12.5 minimum compression ratio advised.   | R-272/420-2-10                   | 4200-8200             | 808821 <sup>b</sup>                        | 28570-16 <sup>e</sup>  | 272                 | 304                 | 110                | 30 62               | .020        | .672         |
|   |                                  |                       |  |                        | 282                 | 314                 |                    | 75 27               | .020        | .672         |
| Competition only, good upper RPM HP, Super Stock, stick shift or auto w/trans brake, 12.5 minimum compression ratio advised.  | R-282/450-2S2-8                  | 5000-8800             | 808351 <sup>b</sup>                        | 28570-16 <sup>e</sup>  | 282                 | 322                 | 108                | 36 66               | .026        | .720         |
|   |                                  |                       |  |                        | 292                 | 332                 |                    | 77 35               | .026        | .681         |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** Refer to the chart on page 270 to determine which bank angle engine you have.

**NOTE:** Camshafts for the 45° bank angle engines (79-prefix) are available on special order.

**NOTE:** The proper Crane pushrods should be used with Crane lifters to provide the most accurate valve adjustment. Refer to the chart on page 270 for the correct cam, lifter and pushrod applications.

**NOTE:** For hydraulic roller, mechanical lifter, and roller lifter camshaft applications, it is highly recommended that the cylinder heads be machined for 99157-16 7/16" screw-in studs and pushrod guideplates, to provide a means of effecting valve adjustment. Custom length heat treated pushrods will then be required. Refer to page 305 for special pushrod ordering instructions.

**NOTE:** 1985-1990 307 cu.in. engines are 39° bank angle and are equipped with hydraulic roller camshafts and tappets. Tappet diameter is .921". Conventional hydraulic, hydraulic roller, mechanical, or roller camshafts and lifters can be installed in these engines if a thrust spacer is fabricated and the appropriate kit components are used. Bushing the lifter bores to .842" diameter would also be required.

Since 1975 General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350                       | See pg. 362           | See pg. 360                                  | See pg. 306 | See pg. 328                    | See pg. 312       | See pg. 315                                    | See pg. 317           |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|-------------|--------------------------------|-------------------|--|-----------------------|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS    | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE   |
|                                | 99838-16              | 99953-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | c           | 80975-1 <sup>k</sup>           |                   | 28774-16 <sup>l</sup><br>80744-16 <sup>m</sup> | 80757-16 <sup>n</sup> |
|                                | 99893-16              | 99953-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | c           | 80975-1 <sup>k</sup>           |                   | 28774-16 <sup>l</sup><br>80744-16 <sup>m</sup> | 80757-16 <sup>n</sup> |
|                                | 99893-16              | 99953-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | c           | 80975-1 <sup>k</sup>           |                   | 28774-16 <sup>l</sup><br>80744-16 <sup>m</sup> | 80757-16 <sup>n</sup> |
|                                | 99893-16              | 99953-16<br>99969-16 <sup>g</sup> | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup><br>99094-1 <sup>j</sup> | c           | 80975-1 <sup>k</sup>           |                   | 28774-16 <sup>l</sup><br>80744-16 <sup>m</sup> | 80757-16 <sup>n</sup> |
| 11310-1                        | 99838-16              | 99944-16                          | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup>                         |             | 80975-1 <sup>k</sup>           |                   | 28774-16 <sup>l</sup>                          | 80757-16 <sup>n</sup> |
| 11310-1                        | 99838-16              | 99944-16                          | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup>                         |             | 80975-1 <sup>k</sup>           |                   | 28774-16 <sup>l</sup>                          | 80757-16 <sup>n</sup> |
|                                | 99885-16 <sup>f</sup> | 99678-16 <sup>h</sup>             | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup>                         |             | 80975-1 <sup>k</sup>           |                   | 28774-16 <sup>l</sup>                          | 80757-16 <sup>n</sup> |
|                                | 99885-16 <sup>f</sup> | 99678-16 <sup>h</sup>             | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup>                         |             | 80975-1 <sup>k</sup>           |                   | 28774-16 <sup>l</sup>                          | 80757-16 <sup>n</sup> |
|                                | 99885-16 <sup>f</sup> | 99678-16 <sup>h</sup>             | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup>                         |             | 80975-1 <sup>k</sup>           |                   | 28774-16 <sup>l</sup>                          | 80757-16 <sup>n</sup> |
|                                | 99885-16 <sup>f</sup> | 99678-16 <sup>h</sup>             | 99820-16 <sup>f</sup> | 99097-1 <sup>i</sup>                         |             | 80975-1 <sup>k</sup>           |                   | 28774-16 <sup>l</sup>                          | 80757-16 <sup>n</sup> |

- a Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required.
- b Requires 80990-1 aluminum-bronze distributor drive gear.
- c Vertical locking bar hydraulic roller lifters, no machining required. Special length pushrods are required, see page 305 for special pushrod ordering instructions.
- d Refer to chart on page 270 for correct application, requires appropriate Crane pushrods, see IMPORTANT NOTE on opposite page.
- e Ultra Pro Series roller lifters.
- f Must machine cylinder heads.
- g Requires Crane Multi Fit valve locks.
- h Must use 99097-1 valve stem locks, included with the retainers.
- i Machined steel, heat treated.

- j Machined steel, heat treated, Multi Fit.
- k Performance steel billet gears and roller chain set.
- l Crane Classic extruded, 1.65 ratio, 7/16" stud, must machine cylinder heads and install 99157-16 rocker arms studs and aftermarket pushrod guideplates. Special heat treated pushrods are required for use with pushrod guideplates.
- m Energiizer, 1.65 ratio, 3/8" stud, must machine cylinder heads and install 99156-16 rocker arm studs and aftermarket pushrod guideplates. Special heat treated pushrods are required for use with pushrod guideplates.
- n 1.6 ratio, 7/16" stud, must machine cylinder heads and install 99157-16 rocker arm studs and aftermarket pushrod guideplates. Special heat treated pushrods are required for use with pushrod guideplates.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code       | LIFTERS  | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|--|----------------------------------|-----------------------|--|--|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>  |                                  |                       |  |  |  |   |                               |  |                             |                               |
| Brute low-end torque, smooth idle, daily usage, fuel economy, 1600-2200 cruise RPM, 7.75 to 8.75 compression ratio advised.  | <b>H-192/2667-2S-12</b>          | 800-4200              | <b>280511*</b><br>◆                              | <b>99282-16<sup>c</sup></b>                                | 192<br>204                                 | 248<br>260                                    | 112                           | (11) 23<br>39 (15)                           | .000<br>.000                | .400<br>.427                  |
| Good low end torque, smooth idle, daily usage, towing, economy, also mild turbocharged, 2200-2600 cruise RPM, 8.0 to 9.5 compression ratio advised.  | <b>H-260-2</b>                   | 1200-4800             | <b>283901*</b><br><b>283902<sup>a</sup></b><br>◆ | <b>99282-16<sup>c</sup></b>                                | 204<br>216                                 | 260<br>272                                    | 112                           | (5) 29<br>49 (9)                             | .000<br>.000                | .427<br>.454                  |
| Replacement for factory Ram Air or H.O. 400 cu.in. "S" camshaft.   | <b>BluePrinted<br/>9779068</b>   | 1600-5000             | <b>968781</b><br>◆                               | <b>99282-16<sup>c</sup></b>                                | 212<br>225                                 |   | 115.5                         | (7) 39<br>50.5 (5.5)                         | .000<br>.000                | .408<br>.407                  |
| Strong mid range torque, good idle, daily usage, off road, highway towing, fuel efficiency plus performance, 2600-3000 cruise RPM, 8.75 to 10.0 compression ratio advised.   | <b>Energizer<br/>272 H10</b>     | 1800-5200             | <b>10507*</b><br><b>105072<sup>b</sup></b><br>◆  | <b>99282-16<sup>c</sup></b>                                | 216<br>216                                 | 272<br>272                                    | 110                           | 3 33<br>43 (7)                               | .000<br>.000                | .454<br>.454                  |
| Good low and mid range torque, good idle, daily usage, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised.  | <b>H-272-2</b>                   | 1800-5400             | <b>283941*</b><br><b>283942<sup>a</sup></b><br>◆ | <b>99282-16<sup>c</sup></b>                                | 216<br>228                                 | 272<br>284                                    | 112                           | 1 35<br>51 (3)                               | .000<br>.000                | .454<br>.480                  |
| Good low and mid range torque and HP, good idle, daily usage, towing, performance and fuel efficiency, 2400-3200 cruise RPM, 8.75 to 10.5 compression ratio advised.   | <b>Z-268-2</b>                   | 1800-5600             | <b>283511*</b><br><b>283512<sup>a</sup></b><br>◆ | <b>99282-16<sup>c</sup></b>                                | 218<br>224                                 | 268<br>274                                    | 112                           | 2 36<br>49 (5)                               | .000<br>.000                | .459<br>.473                  |
| Good mid range torque and HP, excellent for 455 SD, fair idle, moderate performance usage, mild bracket racing, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.  | <b>H-278-2</b>                   | 2000-5600             | <b>283801*</b><br><b>283802<sup>a</sup></b><br>◆ | <b>99282-16<sup>c</sup></b><br><b>99382-16<sup>d</sup></b> | 222<br>234                                 | 278<br>290                                    | 114                           | 2 40<br>56 (2)                               | .000<br>.000                | .467<br>.494                  |
| Good mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised. Good w/plate nitrous system.        | <b>H-288-2</b>                   | 2400-6000             | <b>283951*</b><br><b>283952<sup>a</sup></b><br>◆ | <b>99282-16<sup>c</sup></b><br><b>99382-16<sup>d</sup></b> | 226<br>234                                 | 288<br>296                                    | 114                           | 4 42<br>56 (2)                               | .000<br>.000                | .458<br>.473                  |
| Good mid range HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3400-3800 cruise RPM, 9.5 to 11.0 compression ratio advised.  | <b>Energizer<br/>284 H12</b>     | 2800-6200             | <b>10508*</b><br><b>105082<sup>b</sup></b><br>◆  | <b>99282-16<sup>c</sup></b><br><b>99382-16<sup>d</sup></b> | 228<br>228                                 | 284<br>284                                    | 112                           | 7 41<br>51 (3)                               | .000<br>.000                | .480<br>.480                  |
| Replacement for factory Ram Air IV "T" camshaft.   | <b>BluePrinted<br/>9794041</b>   | 2600-6000             | <b>969681</b><br>◆                               | <b>99282-16<sup>c</sup></b><br><b>99382-16<sup>d</sup></b> | 230<br>240                                 |   | 113.5                         | 2 48<br>54 6                                 | .000<br>.000                | .469<br>.469                  |
| Good mid to upper RPM torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3400-4000 cruise RPM, 9.5 to 11.0 compression ratio advised. Good w/plate nitrous system. | <b>Z-280-2</b>                   | 2600-6400             | <b>283521*</b><br><b>283522<sup>a</sup></b><br>◆ | <b>99282-16<sup>c</sup></b><br><b>99382-16<sup>d</sup></b> | 230<br>240                                 | 280<br>290                                    | 112                           | 8 42<br>57 3                                 | .000<br>.000                | .486<br>.494                  |
| Performance usage, good mid range torque and HP, bracket racing, auto trans with 3000+ converter, good with aftermarket cylinder heads, 9.5 to 11.5 compression ratio advised.   | <b>H-234/325-10</b>              | 3000-6400             | <b>280441*</b><br>◆                              | <b>99282-16<sup>c</sup></b><br><b>99382-16<sup>d</sup></b> | 234<br>234                                 | 304<br>304                                    | 110                           | 12 42<br>52 2                                | .000<br>.000                | .488<br>.488                  |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** In order to effect valve adjustment when using mechanical lifter and roller lifter camshafts, and to provide the most accurate adjustment on hydraulic lifter camshafts, a set of positive locking nuts, such as **99768-16**, must be obtained for the rocker arm studs.

**NOTE:** Specify if casting number 540306, 544127, or 9771980 heads with 1.65 ratio rocker arms are being used, as different valve springs will be required.

**NOTE:** Be sure to maintain at least .040" clearance between the underside of the rocker arm and valve spring retainer when the valve is closed.

Since 1975 General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



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**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>                             | <i>See pg. 350</i> | <i>See pg. 362</i>    | <i>See pg. 360</i>   | <i>See pg. 306</i>                             | <i>See pg. 328</i>             | <i>See pg. 312</i>    | <i>See pg. 315</i>                             | <i>See pg. 317</i>                             |
|--------------------------------|--|--------------------|-----------------------|----------------------|--|--------------------------------|-----------------------|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS                                  | RETAINERS          | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS     | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE                            |
| 28308-1 <sup>e</sup>           | 99840-16 <sup>e</sup><br>99838-16 <sup>f</sup> | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup> | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |
| 28308-1 <sup>e</sup>           | 99840-16 <sup>e</sup><br>99838-16 <sup>f</sup> | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup> | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |
| 28308-1 <sup>e</sup>           | 99840-16 <sup>e</sup><br>99838-16 <sup>f</sup> | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup> | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |
| 28308-1 <sup>e</sup>           | 99840-16 <sup>e</sup><br>99838-16 <sup>f</sup> | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup> | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |
| 28308-1 <sup>e</sup>           | 99840-16 <sup>e</sup><br>99838-16 <sup>f</sup> | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup> | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |
| 28308-1 <sup>e</sup>           | 99840-16 <sup>e</sup><br>99838-16 <sup>f</sup> | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup> | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |
| 28308-1 <sup>e</sup>           | 99840-16 <sup>e</sup><br>99838-16 <sup>f</sup> | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup> | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |
| 28308-1 <sup>e</sup>           | 99840-16 <sup>e</sup><br>99838-16 <sup>f</sup> | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup> | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |
| 28308-1 <sup>e</sup>           | 99840-16 <sup>e</sup><br>99838-16 <sup>f</sup> | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup> | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |
| 28308-1 <sup>e</sup>           | 99840-16 <sup>e</sup><br>99838-16 <sup>f</sup> | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup> | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |
| 11310-1 <sup>f</sup>           | 99838-16 <sup>f</sup>                          | 99944-16           | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup> | 28624-16 <sup>j</sup>                          | 28975-1 <sup>k</sup>           | 28800-16 <sup>l</sup> | 28774-16 <sup>m</sup><br>28747-16 <sup>n</sup> | 28750-16 <sup>o</sup><br>28758-16 <sup>p</sup> |

**Section Continued**

- a Cam and Lifter Kit, includes assembly lubricants and rocker arm adjusting nuts (not for use in 265 and 301 cu.in. engines).
- b Cam and Lifter Kit, includes assembly lubricants (not for use in 265 and 301 cu.in. engines).
- c 265 and 301 cu.in. engines require **99277-16** lifters.
- d Optional Hi Intensity hydraulic lifters, see page 292 for details (265 and 301 cu.in. engines require **99377-16** lifters).
- e Contains standard diameter valve springs, no machining required.
- f Dual valve springs, no machining required.
- g Must machine cylinder heads.
- h Machined steel, heat treated.

- i Pro Series one-piece, for non-guideplate cylinder heads.
- j Heavy wall, heat treated, for use with pushrod guideplate cylinder heads.
- k Performance steel billet gears and roller chain set.
- l 1.5 ratio, for 67-79 engines with 7/16" bottleneck studs and 3/8" nuts.
- m Crane Classic aluminum, 1.65 ratio, for straight 7/16" rocker arm studs.
- n EnergiZER 1.65 ratio, for straight 7/16" rocker arm studs.
- o 1.5 ratio, for 7/16" bottleneck studs and 3/8" nuts.
- p 1.65 ratio, for straight 7/16" rocker arm studs.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int.<br>Exh. | Gross<br>Lift<br>Int.<br>Exh. |
|---|----------------------------------|-----------------------|--|---------|--|---|-------------------------------|--|-----------------------------|-------------------------------|
| <b>Hydraulic Lifter Camshafts</b>   |                                  |                       |  |         |  |   |                               |  |                             |                               |
| Good mid to upper RPM torque and HP, 455+ with aluminum heads, fair idle, performance usage, bracket racing, auto trans w/3000+ converter, 3800-4200 cruise RPM, 10.0 to 11.5 compression ratio advised.    | <b>H-296-2</b>                   | 2800-6600             | <b>284281*</b>                             | 3       | <b>99282-16<sup>b</sup></b>                | 234   | 296                           | 112  | 10 44                       | .000 .473                     |
|   |                                  |                       |  |         | <b>99382-16<sup>c</sup></b>                | 242   | 304                           | 58 4   | .000 .488                   |                               |
| Good upper RPM torque and HP, rough idle, bracket racing, auto trans w/3500+ converter, 10.5 to 12.0 compression ratio advised.   | <b>H-244/3387-2-8</b>            | 3400-6800             | <b>280451*</b>                             | 3       | <b>99282-16<sup>b</sup></b>                | 244   | 314                           | 108  | 19 45                       | .000 .508                     |
|   |                                  |                       |  |         | <b>99382-16<sup>c</sup></b>                | 254   | 324                           | 60 14  | .000 .532                   |                               |
| Good upper RPM HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 10.5 to 12.0 compression ratio advised. Good w/manifold nitrous system.                                     | <b>H-308-2</b>                   | 3400-7000             | <b>284571*</b>                             | 3       | <b>99282-16<sup>b</sup></b>                | 246   | 308                           | 114  | 14 52                       | .000 .495                     |
|   |                                  |                       |  |         | <b>99382-16<sup>c</sup></b>                | 254   | 316                           | 66 8   | .000 .510                   |                               |
| Moderate competition only, good upper RPM HP, bracket racing, auto trans w/4000+ converter, 12.0 minimum compression ratio advised.   | <b>H-260/360-2S-8</b>            | 3800-7200             | <b>280601*</b>                             | 3       | <b>99282-16<sup>b</sup></b>                | 260   | 330                           | 108  | 24 56                       | .000 .540                     |
|   |                                  |                       |  |         | <b>99382-16<sup>c</sup></b>                | 268   | 338                           | 64 24  | .000 .558                   |                               |
| <b>Hydraulic Roller Camshafts — Retrofit</b>  |                                  |                       |  |         |  |   |                               |  |                             |                               |
| Excellent low end torque, good idle, daily usage, towing, performance and fuel efficiency, 2600-3000 cruise RPM, 8.75 to 10.5 compression ratio advised. Also mild turbo-charged.                           | <b>HR-214/325-2S-12 IG</b>       | 1400-5600             | <b>289611<sup>a</sup></b>                  | 3       | <b>28532-16<sup>d</sup></b>                | 214   | 276                           | 112  | 0 34                        | .000 .488                     |
|   |                                  |                       |  |         |  | 222   | 284                           | 48 (6)                                       | .000 .509                   |                               |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, 3000-3400 cruise RPM, 9.5 to 10.75 compression ratio advised.           | <b>HR-222/339-2S-12 IG</b>       | 1800-6000             | <b>289621<sup>a</sup></b>                  | 3       | <b>28532-16<sup>d</sup></b>                | 222   | 284                           | 112  | 4 38                        | .000 .509                     |
|   |                                  |                       |  |         |  | 230   | 292                           | 52 (2)                                       | .000 .528                   |                               |
| Good mid range torque and HP, fair idle, performance usage, mild bracket racing, auto trans w/2800+ converter, 3200-3600 cruise RPM, best in 389+ cu.in., 10.0 to 11.0 compression ratio advised.           | <b>HR-226/345-2S1-12 IG</b>      | 2000-6200             | <b>289661<sup>a</sup></b>                  | 3       | <b>28532-16<sup>d</sup></b>                | 226   | 288                           | 112  | 6 40                        | .000 .518                     |
|   |                                  |                       |  |         |  | 234   | 296                           | 54 0   | .000 .539                   |                               |
| Good mid range torque and HP, fair idle, performance usage, mild bracket racing, auto trans w/3000+ converter, 3600-4200 cruise RPM, best in 400+ cu.in., 10.0 to 11.5 compression ratio advised.           | <b>HR-230/352-2S1-14 IG</b>      | 2200-6400             | <b>289631<sup>a</sup></b>                  | 3       | <b>28532-16<sup>d</sup></b>                | 230   | 292                           | 114  | 6 44                        | .000 .528                     |
|   |                                  |                       |  |         |  | 238   | 300                           | 58 0   | .000 .548                   |                               |
| Good mid range and upper RPM torque and HP, fair idle, performance usage, bracket racing, auto trans w/3200+ converter, 4000-4600 cruise RPM, best in 455+ cu.in., 10.0 to 11.5 compression ratio advised.  | <b>HR-238/365-2S1-14 IG</b>      | 2600-6600             | <b>289651<sup>a</sup></b>                  | 3       | <b>28532-16<sup>d</sup></b>                | 238   | 300                           | 114  | 10 48                       | .000 .548                     |
|   |                                  |                       |  |         |  | 246   | 308                           | 62 4   | .000 .558                   |                               |
| Good mid range and upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 4200-5000 cruise RPM, best in 455+ cu.in., 10.5 to 12.0 compression ratio advised. | <b>HR-242/372-2-14 IG</b>        | 3000-6800             | <b>289641<sup>a</sup></b>                  | 3       | <b>28532-16<sup>d</sup></b>                | 242   | 304                           | 114  | 12 50                       | .000 .558                     |
|   |                                  |                       |  |         |  | 252   | 314                           | 65 7   | .000 .558                   |                               |

**RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.**

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** To provide the most accurate adjustment on hydraulic lifter and hydraulic roller camshafts, a set of positive locking nuts, such as **99768-16**, must be obtained for the rocker arm studs.

**NOTE:** Specify if casting number 540306, 544127, or 9771980 heads with 1.65 ratio rocker arms are being used, as different valve springs will be required.

**NOTE:** Be sure to maintain at least .040" clearance between the underside of the rocker arm and valve spring retainer when the valve is closed.

Since 1975 General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| <i>See pg. 358</i>             | <i>See pg. 337</i>    | <i>See pg. 350</i>                | <i>See pg. 362</i>    | <i>See pg. 360</i>                           | <i>See pg. 306</i>                             | <i>See pg. 328</i>             | <i>See pg. 312</i>    | <i>See pg. 315</i>                             | <i>See pg. 317</i>                             |
|--------------------------------|-----------------------|-----------------------------------|-----------------------|--|--|--------------------------------|-----------------------|--|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS                         | VALVE STEM SEALS      | VALVE STEM LOCKS                             | PUSHRODS                                       | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS     | — ALUMINUM CRANE CLASSIC/ ENERGIZER            | ROCKERS — GOLD RACE                            |
| 11310-1 <sup>e</sup>           | 99838-16 <sup>e</sup> | 99944-16                          | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup>                         | 95654-16 <sup>j</sup><br>28624-16 <sup>k</sup> | 28975-1 <sup>m</sup>           | 28800-16 <sup>n</sup> | 28774-16 <sup>o</sup><br>28747-16 <sup>p</sup> | 28750-16 <sup>q</sup><br>28758-16 <sup>r</sup> |
| 11310-1 <sup>e</sup>           | 99838-16 <sup>e</sup> | 99944-16                          | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup>                         | 95654-16 <sup>j</sup><br>28624-16 <sup>k</sup> | 28975-1 <sup>m</sup>           | 28800-16 <sup>n</sup> | 28774-16 <sup>o</sup><br>28747-16 <sup>p</sup> | 28750-16 <sup>q</sup><br>28758-16 <sup>r</sup> |
| 11310-1 <sup>e</sup>           | 99838-16 <sup>e</sup> | 99944-16                          | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup>                         | 95654-16 <sup>j</sup><br>28624-16 <sup>k</sup> | 28975-1 <sup>m</sup>           | 28800-16 <sup>n</sup> | 28774-16 <sup>o</sup><br>28747-16 <sup>p</sup> | 28750-16 <sup>q</sup><br>28758-16 <sup>r</sup> |
|                                | 99893-16 <sup>e</sup> | 99953-16                          | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup>                         | 95654-16 <sup>j</sup><br>28624-16 <sup>k</sup> | 28975-1 <sup>m</sup>           | 28800-16 <sup>n</sup> | 28774-16 <sup>o</sup><br>28747-16 <sup>p</sup> | 28750-16 <sup>q</sup><br>28758-16 <sup>r</sup> |
|                                | 99893-16 <sup>e</sup> | 99953-16<br>99973-16 <sup>f</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup><br>99094-1 <sup>i</sup> | l  | 28975-1 <sup>m</sup>           |                       | 28774-16 <sup>o</sup><br>28747-16 <sup>p</sup> | 28750-16 <sup>q</sup><br>28758-16 <sup>r</sup> |
|                                | 99893-16 <sup>e</sup> | 99953-16<br>99973-16 <sup>f</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup><br>99094-1 <sup>i</sup> | l  | 28975-1 <sup>m</sup>           |                       | 28774-16 <sup>o</sup><br>28747-16 <sup>p</sup> | 28750-16 <sup>q</sup><br>28758-16 <sup>r</sup> |
|                                | 99893-16 <sup>e</sup> | 99953-16<br>99973-16 <sup>f</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup><br>99094-1 <sup>i</sup> | l  | 28975-1 <sup>m</sup>           |                       | 28774-16 <sup>o</sup><br>28747-16 <sup>p</sup> | 28750-16 <sup>q</sup><br>28758-16 <sup>r</sup> |
|                                | 99893-16 <sup>e</sup> | 99953-16<br>99973-16 <sup>f</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup><br>99094-1 <sup>i</sup> | l  | 28975-1 <sup>m</sup>           |                       | 28774-16 <sup>o</sup><br>28747-16 <sup>p</sup> | 28750-16 <sup>q</sup><br>28758-16 <sup>r</sup> |
|                                | 99893-16 <sup>e</sup> | 99953-16<br>99973-16 <sup>f</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup><br>99094-1 <sup>i</sup> | l  | 28975-1 <sup>m</sup>           |                       | 28774-16 <sup>o</sup><br>28747-16 <sup>p</sup> | 28750-16 <sup>q</sup><br>28758-16 <sup>r</sup> |
|                                | 99893-16 <sup>e</sup> | 99953-16<br>99973-16 <sup>f</sup> | 99820-16 <sup>g</sup> | 99097-1 <sup>h</sup><br>99094-1 <sup>i</sup> | l  | 28975-1 <sup>m</sup>           |                       | 28774-16 <sup>o</sup><br>28747-16 <sup>p</sup> | 28750-16 <sup>q</sup><br>28758-16 <sup>r</sup> |

**a** Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. Not for use in 265 and 301 engines.  
**b** 265 and 301 cu.in. engines require **99277-16** lifters.  
**c** Optional Hi Intensity hydraulic lifters, see page 292 for details (265 and 301 cu.in. engines require **99377-16** lifters).  
**d** Vertical locking bar hydraulic roller lifters, no machining required. Not for use in 265 and 301 engines. Special length pushrods are required, Refer to page 305 for special pushrod ordering instructions.  
**e** Contains dual valve springs, no machining required.  
**f** Requires Crane Multi Fit valve locks.  
**g** Must machine cylinder heads.  
**h** Machined steel, heat treated.  
**i** Machined steel, heat treated, Multi Fit.  
**j** Pro Series one-piece, for non-guideplate cylinder heads.  
**k** Heavy wall, heat treated, for use with pushrod guideplate cylinder heads.  
**l** Special length pushrods are required. See page 305 for special pushrod ordering instructions.  
**m** Performance steel billet gears and roller chain set.  
**n** 1.5 ratio, for 67-79 engines with 7/16" bottleneck studs and 3/8" nuts.  
**o** Crane Classic extruded, 1.65 ratio, for straight 7/16" rocker arm studs.  
**p** Energiizer, 1.65 ratio, for straight 7/16" rocker arm studs.  
**q** 1.5 ratio, for 7/16" bottleneck studs and 3/8" nuts.  
**r** 1.65 ratio, for straight 7/16" rocker arm studs.

## COMPLETE CAM SPECIFICATIONS

See pg. 293

| Application  | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | LIFTERS                     | Degrees<br>Duration<br>@ .050"<br>Int/Exh. | Advertised<br>Degrees<br>Duration<br>Int/Exh. | Degrees<br>Lobe<br>Separation | Open/Close<br>@ .050"<br>Cam Lift<br>Int/Exh | Lash<br>Hot<br>Int. | Gross<br>Lift<br>Int. |
|--|----------------------------------|-----------------------|--|-----------------------------|--|---|-------------------------------|--|---------------------|-----------------------|
| <b>Mechanical Lifter Camshafts</b>   |                                  |                       |  |                             |  |   |                               |  |                     |                       |
| Replacement for factory 389-421 Super Duty McKellar no. 10   | <b>BluePrinted<br/>541596</b>    | 2600-<br>6400         | <b>280901</b>                              | <b>99255-16<sup>c</sup></b> | 236<br>247                                 | 268<br>284                                    | 113.5                         | 2 54<br>54.5 12.5                            | .012<br>.018        | .416<br>.420          |
| Good low end and mid range torque and HP, rough idle, moderate performance usage, limited oval track, bracket racing, auto trans w/2500+ converter, 10.5 to 12.0 compression ratio advised.  | <b>F-244/3454-2S-6</b>           | 3000-<br>7000         | <b>280921<sup>*</sup></b>                  | <b>99255-16<sup>c</sup></b> | 244<br>252                                 | 280<br>288                                    | 106                           | 19 45<br>55 17                               | .026<br>.026        | .518<br>.536          |
| Good mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, good w/plate nitrous, 10.0 to 11.5 compression ratio advised.  | <b>F-248/3334-2-12</b>           | 3400-<br>7000         | <b>281241<sup>*</sup></b>                  | <b>99255-16<sup>c</sup></b> | 248<br>258                                 | 290<br>300                                    | 112                           | 17 51<br>66 12                               | .022<br>.022        | .500<br>.520          |
| Good mid range torque and HP, rough idle, performance usage, short oval track, bracket racing, auto trans w/3000+ converter, 11.5 to 12.5 compression ratio advised.   | <b>F-252/3574-2S1-6</b>          | 3600-<br>7400         | <b>280981<sup>*</sup></b>                  | <b>99255-16<sup>c</sup></b> | 252<br>260                                 | 288<br>296                                    | 106                           | 23 49<br>59 21                               | .026<br>.026        | .536<br>.554          |
| Good mid range and upper RPM torque and HP, rough idle, performance usage, bracket racing, auto trans w/3500+ converter, 12.0 minimum compression ratio advised.   | <b>F-260/3694-2S-8</b>           | 4000-<br>7600         | <b>281441<sup>*</sup></b>                  | <b>99255-16<sup>c</sup></b> | 260<br>268                                 | 296<br>304                                    | 108                           | 25 55<br>65 23                               | .026<br>.026        | .554<br>.572          |
| <b>Mechanical Roller Camshafts</b>   |                                  |                       |  |                             |  |   |                               |  |                     |                       |
| Excellent low end torque and HP, good idle, daily performance usage, mild bracket racing, 3000-3400 cruise RPM, 10.0 to 11.5 compression ratio advised.  | <b>SR-228/338-2S-12 IG</b>       | 2200-<br>6200         | <b>288541<sup>*a</sup></b>                 | <b>28570-16<sup>d</sup></b> | 228<br>236                                 | 278<br>286                                    | 112                           | 7 41<br>55 1                                 | .020<br>.020        | .507<br>.525          |
| Good low end and mid range torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/2500+ converter, good w/plate nitrous, 3400-3800 cruise RPM, 10.0 to 11.5 compression ratio advised.                            | <b>SR-236/350-2S-12 IG</b>       | 2600-<br>6600         | <b>288551<sup>*a</sup></b>                 | <b>28570-16<sup>d</sup></b> | 236<br>244                                 | 286<br>294                                    | 112                           | 11 45<br>59 5                                | .020<br>.020        | .525<br>.543          |
| Good mid to upper RPM torque and HP, fair idle, moderate performance usage, mild bracket racing, auto trans w/3000+ converter, good w/plate nitrous, 3800-4200 cruise RPM, best with 421+ cu.in., 10.5 to 12.0 compression ratio advised.          | <b>SR-244/362-2S-12 IG</b>       | 3000-<br>7000         | <b>288521<sup>*a</sup></b>                 | <b>28570-16<sup>d</sup></b> | 244<br>252                                 | 294<br>302                                    | 112                           | 15 49<br>63 9                                | .020<br>.020        | .543<br>.561          |
| Good upper RPM torque and HP, rough idle, moderate performance usage, bracket racing, auto trans w/3500+ converter, good w/plate nitrous, 4000-4400 cruise RPM, best with 455+ cu.in. with aluminum heads, 11.0 minimum compression ratio advised. | <b>SR-252/374-2S-12 IG</b>       | 3400-<br>7200         | <b>288531<sup>*a</sup></b>                 | <b>28570-16<sup>d</sup></b> | 252<br>256                                 | 302<br>306                                    | 112                           | 19 53<br>65 11                               | .020<br>.020        | .561<br>.561          |
| Competition only, good mid to upper RPM torque and HP, bracket racing, auto trans w/race converter, good w/manifold nitrous, best w/455+ cu.in. with aluminum heads, 12.0 minimum compression ratio advised.                                       | <b>R-268/420-2S-10</b>           | 4200-<br>7800         | <b>288811<sup>*b</sup></b>                 | <b>28570-16<sup>d</sup></b> | 268<br>276                                 | 300<br>308                                    | 110                           | 28 60<br>72 24                               | .020<br>.020        | .630<br>.630          |

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

**IMPORTANT:** Adjustable Vacuum Advance Kit available. See page 333 for details.

**NOTE:** In order to effect valve adjustment when using mechanical lifter and roller lifter camshafts, a set of positive locking nuts, such as **99768-16**, must be obtained for the rocker arm studs.

**NOTE:** Specify if casting number 540306, 544127, or 9771980 heads with 1.65 ratio rocker arms are being used.

**NOTE:** Be sure to maintain at least .040" clearance between the underside of the rocker arm and valve spring retainer when the valve is closed.

Since 1975 General Motors divisions have exchanged engines throughout different models. Be certain of exactly which engine you have before ordering.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

| See pg. 358                    | See pg. 337           | See pg. 350           | See pg. 362           | See pg. 360          | See pg. 306   | See pg. 328                    | See pg. 312       | See pg. 315                         | See pg. 317                                    |
|--------------------------------|-----------------------|-----------------------|-----------------------|----------------------|---|--------------------------------|-------------------|-------------------------------------|--|
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS         | RETAINERS             | VALVE STEM SEALS      | VALVE STEM LOCKS     | PUSHRODS  | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS | — ALUMINUM CRANE CLASSIC/ ENERGIZER | ROCKERS — GOLD RACE                            |
| 11310-1                        | 99838-16              | 99944-16              | 99820-16 <sup>f</sup> | 99097-1 <sup>g</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup><br>95663-16 <sup>k</sup> | 28975-1 <sup>l</sup>           |                   | 28774-16 <sup>m</sup>               | 28750-16 <sup>n</sup><br>28758-16 <sup>o</sup> |
| 11310-1                        | 99838-16              | 99944-16              | 99820-16 <sup>f</sup> | 99097-1 <sup>g</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup><br>95663-16 <sup>k</sup> | 28975-1 <sup>l</sup>           |                   | 28774-16 <sup>m</sup>               | 28750-16 <sup>n</sup><br>28758-16 <sup>o</sup> |
| 11310-1                        | 99838-16              | 99944-16              | 99820-16 <sup>f</sup> | 99097-1 <sup>g</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup><br>95663-16 <sup>k</sup> | 28975-1 <sup>l</sup>           |                   | 28774-16 <sup>m</sup>               | 28750-16 <sup>n</sup><br>28758-16 <sup>o</sup> |
| 11310-1                        | 99838-16              | 99944-16              | 99820-16 <sup>f</sup> | 99097-1 <sup>g</sup> | 95654-16 <sup>i</sup><br>28624-16 <sup>j</sup><br>95663-16 <sup>k</sup> | 28975-1 <sup>l</sup>           |                   | 28774-16 <sup>m</sup>               | 28750-16 <sup>n</sup><br>28758-16 <sup>o</sup> |
|                                | 96870-16              | 99973-16 <sup>e</sup> | 99820-16 <sup>f</sup> | 99094-1 <sup>h</sup> | 28624-16 <sup>j</sup><br>95663-16 <sup>k</sup>                          | 28975-1 <sup>l</sup>           |                   | 28774-16 <sup>m</sup>               | 28750-16 <sup>n</sup><br>28758-16 <sup>o</sup> |
|                                | 96870-16              | 99973-16 <sup>e</sup> | 99820-16 <sup>f</sup> | 99094-1 <sup>h</sup> | 28624-16 <sup>j</sup><br>95663-16 <sup>k</sup>                          | 28975-1 <sup>l</sup>           |                   | 28774-16 <sup>m</sup>               | 28750-16 <sup>n</sup><br>28758-16 <sup>o</sup> |
|                                | 96870-16              | 99973-16 <sup>e</sup> | 99820-16 <sup>f</sup> | 99094-1 <sup>h</sup> | 28624-16 <sup>j</sup><br>95663-16 <sup>k</sup>                          | 28975-1 <sup>l</sup>           |                   | 28774-16 <sup>m</sup>               | 28750-16 <sup>n</sup><br>28758-16 <sup>o</sup> |
|                                | 96870-16              | 99973-16 <sup>e</sup> | 99820-16 <sup>f</sup> | 99094-1 <sup>h</sup> | 28624-16 <sup>j</sup><br>95663-16 <sup>k</sup>                          | 28975-1 <sup>l</sup>           |                   | 28774-16 <sup>m</sup>               | 28750-16 <sup>n</sup><br>28758-16 <sup>o</sup> |
|                                | 99896-16 <sup>d</sup> | 99974-16 <sup>e</sup> | 99820-16 <sup>f</sup> | 99094-1 <sup>h</sup> | 28624-16 <sup>j</sup><br>95663-16 <sup>k</sup>                          | 28975-1 <sup>l</sup>           |                   | 28774-16 <sup>m</sup>               | 28750-16 <sup>n</sup><br>28758-16 <sup>o</sup> |

- a Camshaft incorporates an integral cast iron distributor drive gear, aluminum-bronze distributor drive gear not required. Not for use in 265 and 301 engines.
- b Requires **28990-1** aluminum-bronze distributor drive gear. Not for use in 265 and 301 engines.
- c Due to block casting variations, you must check that the lifter relief band is not exposed at the bottom of the lifter bore when the lifter is on the base circle of the camshaft.
- d Ultra Pro Series roller lifters.
- e Requires Crane Multi Fit valve locks.
- f Must machine cylinder heads.
- g Machined steel, heat treated.
- h Machined steel, heat treated, Multi Fit.
- i Pro Series one-piece, for non-guideplate cylinder heads.
- j Heavy wall, heat treated, for use with pushrod guideplate cylinder heads.
- k Pro Series one piece for use with or without pushrod guideplate cylinder heads.
- l Performance steel billet gears and roller chain set.
- m Crane Classic extruded 1.65 ratio, for straight 7/16" studs.
- n 1.5 ratio, for 7/16" bottleneck studs and 3/8" nuts.
- o 1.65 ratio, for straight 7/16" studs.

## COMPLETE CAM SPECIFICATIONS

| Application   | Camshaft Series/<br>Grind Number | RPM<br>POWER<br>RANGE | Camshaft<br>PART NUMBER/<br>Emissions Code | See pg. 286<br>FOLLOWERS | Degrees             | Advertised          | Degrees            | Open/Close                       | Lash        | Gross        |
|---|----------------------------------|-----------------------|--|--------------------------|---------------------|---------------------|--------------------|----------------------------------|-------------|--------------|
|   |                                  |                       |  |                          | Duration<br>@ .050" | Degrees<br>Duration | Lobe<br>Separation | @ .050"<br>Valve Lift<br>Int/Exh | Hot<br>Int. | Lift<br>Int. |
| <b>Mechanical Follower Camshafts</b>  |                                  |                       |  |                          |                     |                     |                    |                                  |             |              |
| Good idle, daily usage, performance upgrade for stock engine, aftermarket intake/exhaust advised, new valve springs recommended, 8.75 to 10.5 compression ratio advised.  | T20-262-2-10                     | 1400-4800             | 704-0010*                                  | a                        | 214                 | 262                 | 110                | 2 32                             | .008        | .416         |
|   |                                  |                       |  |                          | 224                 | 272                 |                    | 47 (3)                           | .010        | .430         |
| Good idle, performance usage, off road, good with mild aftermarket turbo systems, intercooler advised, aftermarket intake/low restriction exhaust and ECM required, 9.5 to 10.75 compression ratio advised.         | T20-272-2-10                     | 1800-5200             | 704-0012*                                  | a                        | 224                 | 272                 | 110                | 7 37                             | .008        | .430         |
|   |                                  |                       |  |                          | 234                 | 282                 |                    | 52 2                             | .010        | .444         |
| Fair idle, good mid to upper RPM torque and HP, moderate performance usage, autocross, road course, 9.5 to 11.5 compression ratio advised.  | T20-282-2-10                     | 2200-5600             | 704-0014*                                  | a                        | 234                 | 282                 | 110                | 12 42                            | .008        | .444         |
|   |                                  |                       |  |                          | 244                 | 292                 |                    | 57 7                             | .010        | .458         |
| Fair idle, moderate performance usage, prepared autocross, bracket racing, aftermarket intake/low restriction exhaust and upgraded valve springs and retainers recommended, 10.5 to 12.0 compression ratio advised. | T20-292-2-10                     | 2600-6000             | 704-0016*                                  | a                        | 244                 | 292                 | 110                | 17 47                            | .008        | .458         |
|   |                                  |                       |  |                          | 254                 | 302                 |                    | 62 12                            | .010        | .472         |
| Moderate competition only, good upper RPM HP, light weight closed course, bracket racing, fully prepared engine needed, 11.0 to 12.5 compression ratio advised.   | T20-302-10                       | 3000-6400             | 704-0100*                                  | a                        | 254                 | 302                 | 110                | 22 52                            | .008        | .472         |
|   |                                  |                       |  |                          | 254                 | 302                 |                    | 62 12                            | .010        | .472         |

CAMSHAFTS

RPM range shown is for average usage. These cam profiles will RPM higher, depending upon application.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



**Custom Grind Cams Also Available – Call 866-388-5120 or go to [cranecams.com](http://cranecams.com) for ordering information**

**CRANE VALVE TRAIN COMPONENTS**

|                                |                    |                    |                    |                    |                    |                                |                    |   |                    |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------------------|--------------------|---|--------------------|
| <i>See pg. 358</i>             | <i>See pg. 337</i> | <i>See pg. 350</i> | <i>See pg. 362</i> | <i>See pg. 360</i> | <i>See pg. 306</i> | <i>See pg. 328</i>             | <i>See pg. 312</i> | <i>See pg. 315</i>                                  | <i>See pg. 317</i> |
| VALVE SPRING AND RETAINER KITS | VALVE SPRINGS      | RETAINERS          | VALVE STEM SEALS   | VALVE STEM LOCKS   | PUSHRODS           | TIMING CHAIN AND GEAR ASSEMBLY | STEEL ROCKER ARMS  | — ALUMINUM ROCKERS —<br>CRANE CLASSIC/<br>ENERGIZER | GOLD RACE          |

**a** We recommend the use of the 22R-22RE followers with the insert-type contact pad.

# Cam and Valve Train Buyer's Guide

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# Camshaft Components

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

## Cam Button Spacers

Engines without a cam thrust plate must use a cam button spacer when using a roller lifter camshaft to limit lateral movement. Our unique needle bearing buttons reduce friction and deliver extra "free" horsepower. Crane solid aluminum spacers are priced for the budget minded racer. Machining of the cam sprocket may be required for proper installation.

| Solid Aluminum Button Application                                | Part No. |
|--|----------|
| <b>Chevrolet 90° V-6 78-86, 200 thru 262</b>                     | 99001-1  |
| <b>Chevrolet V-8 55-95, 262 thru 400</b>                         | 99001-1  |
| <b>Chevrolet V-8 65-95, 396 thru 454</b>                         | 99005-1  |
| <b>Chrysler-Dodge-Plymouth V-8 "B" 70-78, w/3 bolt gear</b>      | 99163-1  |
| <b>Chrysler-Dodge-Plymouth V-8 66-71, 426 Hemi w/3 bolt gear</b> | 99163-1  |
| Needle Bearing Button Application                                | Part No. |
| <b>Chevrolet 90° V-6 78-86, 200 thru 262</b>                     | 99164-1  |
| <b>Chevrolet V-8 55-95, 262 thru 400</b>                         | 99164-1  |
| <b>Chevrolet V-8 65-95, 396 thru 454</b>                         | 99165-1  |



## Camshaft Bolt and Locking Plate Kit

A must to prevent costly valve train damage. Simply install on cam gear, torque bolts properly, bend locking tabs over to secure bolts from loosening.

| Application  | Part No. |
|--|----------|
| <b>Chevrolet 90° V-6 70-86, 200 thru 262 (except factory hydraulic roller engines)</b> | 99168-1  |
| <b>Chevrolet V-8 57-87, 262 thru 400 (except factory hydraulic roller engines)</b>     | 99168-1  |
| <b>Chevrolet V-8 58-65, 348-409-427 (Z-11)</b>   | 99168-1  |
| <b>Chevrolet V-8 65-95, 396-402-427-454-502</b>  | 99168-1  |



## Cam Followers

Crane cam followers are designed and engineered for maximum performance and reliability. They are metallurgically engineered to be compatible with the cam lobe composition of Crane camshafts. *We highly recommend the use of Crane Cams Assembly Lube and Crane Cams Super Lube Break-In Concentrate (see "Lubricants") when installing these followers.*

| Application  | Part No. |
|--|----------|
| <b>Ford SOHC I-4 1974-87, 2300 c.c. (also 1983-87 2000 c.c.)</b> | 19800-8  |

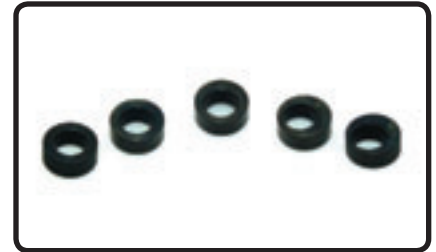




## Cam Degreeing Bushings

Adjusting camshaft phasing with these bushings is one of the ways to vary the camshaft timing. These bushings are either color coded or number stamped with the degree of offset for easy identification. Included in each package are bushings in 0-2-4-6-8 degree increments. Machining of the cam sprocket may be required for proper installation.

| Application  | Part No. |
|--|----------|
| <b>Chevrolet 90° V-6 78-86, 200 thru 262</b>               | 11991-1* |
| <b>Chevrolet V-8 55-95, 262 thru 400</b>                   | 11991-1* |
| <b>Chevrolet V-8 65-95, 396 thru 454</b>                   | 11991-1* |
| <b>Chrysler-Dodge-Plymouth V-8 "B" 58-78, 350 thru 440</b> | 11991-1* |
| <b>Chrysler-Dodge-Plymouth V-8 66-71, 426 Hemi</b>         | 11991-1* |



## Cam Degreeing "Tune-A-Cam" Kit

Everything you need to quickly, easily and accurately degree-in your camshaft for maximum performance. Complete kit contains: precision dial indicator, with custom design base to mount to cylinder head, piston stop, pointer, checking springs, degree wheel and instructions — all in a hard molded plastic carrying case.

| Description                          | Part No. |
|--------------------------------------|----------|
| <b>Tune-A-Cam Kit (Complete Kit)</b> | 99030-1  |



# Distributor-Magneto Drive Gears

## Copper Alloy (Aluminum/Bronze)

These drive gears are made from high silicon copper alloy ("aluminum-bronze") and precision machined. They are required when using an 8620 steel billet cam.

Certain special Crane roller camshafts are manufactured using an Iron Gear pressed onto the steel billet cam. These special cams **DO NOT REQUIRE** an aluminum bronze distributor drive gear. Refer to the specific camshaft application section of catalog. (Iron Gear cams' part numbers have an "IG" suffix at the end of their grind numbers)

Note: The "Shaft Diameter" dimension referred to is the portion of the distributor shaft, or intermediate shaft, that the gear registers on. It may be necessary to remove the original gear to measure the shaft diameter correctly.



| Application  | Part No. |
|--|----------|
| <b>Chevrolet I-4 62-71, 153</b><br>For .491" shaft diameter  | 20990-1  |
| <b>Chevrolet I-6 62-84, 194 thru 250 &amp; 292</b><br>For .491" shaft diameter   | 20990-1  |
| <b>Chevrolet 90° V-6 78-86, 200 thru 262</b><br>For .491" shaft diameter. Also fits Crane and Accel 34000, 35000, and 41000 series | 11990-1  |
| For .500" shaft diameter. Fits Crane, Accel and MSD with standard configuration gear   | 11979-1  |
| <b>Chevrolet 90° V-6 85-91, 262 (4.3 litre)</b><br>For .427" shaft diameter GM HEI distributors with remote coil                   | 11988-1  |
| <b>Chevrolet V-8 55-87, 262 thru 400</b><br>For .491" shaft diameter. Also fits Crane and Accel 34000, 35000, and 41000 series     | 11990-1  |
| For .500" shaft diameter. Fits Crane, Accel and MSD with standard configuration gear   | 11979-1  |
| For .500" shaft diameter, with 5/16" hex drive   | 11973-1  |
| <b>Chevrolet V-8 85-99, 305-350</b><br>For .427" shaft diameter GM HEI distributors with remote coil                               | 11988-1  |
| <b>Chevrolet V-8 58-65, 348-409-427 (Z-11)</b><br>For .491" shaft diameter   | 11990-1  |
| <b>Chevrolet V-8 65-90, 396 thru 502</b><br>For .491" shaft diameter. Also fits Crane and Accel 34000, 35000, and 41000 series     | 11990-1  |
| For .500" shaft diameter. Fits Crane, Accel and MSD with standard configuration gear   | 11979-1  |
| For .500" shaft diameter, with 5/16" hex drive   | 11973-1  |
| <b>Chevrolet V-8 91-00, 454-502</b><br>For .427" shaft diameter GM HEI distributors with remote coil                               | 11988-1  |

## Copper Alloy (Aluminum/Bronze) (continued)

| Application   | Part No. |
|---|----------|
| <b>Chrysler V-8 56-58, 354-392 and Donovan 417</b>  |          |
| For .484" shaft diameter  | 69990-1  |
| <b>Chrysler-Dodge-Plymouth V-8 64-00, "LA" 273-360 and Magnum 5.2-5.9 litre</b>                     |          |
| For .484" shaft diameter  | 69990-1  |
| <b>Chrysler-Dodge-Plymouth V-8 58-78, "B" 350 thru 440</b>  |          |
| For .484" shaft diameter  | 66990-1  |
| <b>Chrysler-Dodge-Plymouth V-8 66-71, 426 Hemi and Keith Black 426, JP-1, BA 426, Rodeck TFX-92</b> |          |
| For .484" shaft diameter  | 66990-1  |
| <b>Ford V-8 62-95, 221 thru 302 and Boss 302</b>  |          |
| For .467" shaft diameter  | 36990-1  |
| For .500" shaft diameter  | 36989-1  |
| For .531" shaft diameter  | 44990-1  |
| <b>Ford V-8 82-95, 302 H.O. (5.0 litre)</b>   |          |
| For .467" shaft diameter  | 36990-1  |
| For .500" shaft diameter  | 36989-1  |
| For .531" shaft diameter  | 44990-1  |
| <b>Ford V-8 69-00, 351W and 351 SVO</b>   |          |
| For .467" shaft diameter  | 36990-1  |
| For .500" shaft diameter  | 36989-1  |
| For .531" shaft diameter  | 44990-1  |
| <b>Ford V-8 70-82, Boss 351-351C-351M-400</b>   |          |
| For .500" shaft diameter  | 52990-1  |
| For .531" shaft diameter  | 52989-1  |
| <b>Ford V-8 58-76, "FE" 332 thru 428</b>  |          |
| For .467" shaft diameter  | 34990-1  |
| For .500" shaft diameter  | 52990-1  |
| For .531" shaft diameter  | 52989-1  |
| <b>Ford V-8 68-97, 370-429-460 (7.5 litre)</b>  |          |
| For .500" shaft diameter  | 52990-1  |
| For .531" shaft diameter  | 52989-1  |
| <b>Oldsmobile V-8 64-84, 260 thru 455</b>   |          |
| For .491" shaft diameter  | 80990-1  |
| <b>Pontiac I-4 77-89, 151 and 2.5 litre S.D.</b>  |          |
| For .491" shaft diameter, 77-78 distributor   | 20990-1  |
| For .491" shaft diameter, 79-89 oil pump  | 20990-1  |
| <b>Pontiac V-8 55-81, 265 thru 455</b>  |          |
| For .489" shaft diameter  | 28990-1  |

# Distributor-Magneto Drive Gears

## Coated Steel Distributor Gears

Crane Cams now offers precision machined, specially coated and processed steel distributor gears for popular engines using either cast flat faced lifter or steel roller camshafts. Since roller lifter cams are made from either induction hardened steel or carburized steel, neither of these materials are compatible with the normal stock distributor gears. In the past, "bronze" distributor gears were used. For street applications these gears can wear at a high rate and may have to be replaced on a regular basis.

By using modern heat treating and manufacturing processes, Crane Cams has developed a series of steel distributor gears that are compatible with standard cast cams and induction hardened and carburized steel roller cams. Crane Cams now makes it possible to use a steel distributor gear that provides OEM-style life-span, eliminating the need to frequently replace bronze alloy gears. These Crane steel gears are available for most popular engines for both stock and aftermarket distributors.

The use of these gears on camshafts that have been previously run with other types or materials of gears, or the unnecessary use of high volume/high pressure oil pumps, can be severely detrimental to the life of the camshaft gear.

**Note:** The "Shaft Diameter" dimension referred to is the portion of the distributor shaft, or intermediate shaft, that the gear registers on. It may be necessary to remove the original gear to measure the shaft diameter correctly.



### Application

### Part No.

#### **Chevrolet 90° V-6 78-86, 200 thru 262**

For .491" shaft diameter. Also fits Crane and Accel 34000, 35000, and 41000 series

11951-1

For .500" shaft diameter with standard configuration gear

11950-1

#### **Chevrolet V-8 55-87, 262-thru 400**

For .491" shaft diameter. Also fits Crane and Accel 34000, 35000, and 41000 series

11951-1

For .500" shaft diameter with standard configuration gear

11950-1

For .500" shaft diameter, with 5/16" hex drive

11952-1

#### **Chevrolet V-8 65-90, 396 thru 502**

For .491" shaft diameter. Also fits Crane and Accel 34000, 35000, and 41000 series

11951-1

For .500" shaft diameter with standard configuration gear

11950-1

For .500" shaft diameter, with 5/16" hex drive

11952-1

#### **Chrysler V-8 56-58, 354-392 and Donovan 417**

For .484" shaft diameter

69970-1

#### **Chrysler-Dodge-Plymouth V-8 64-00, "LA" 273-360 and Magnum 5.2-5.9 litre**

For .484" shaft diameter

69970-1

#### **Chrysler-Dodge-Plymouth V-8 58-78, "B" 350 thru 440**

For .484" shaft diameter

66970-1

#### **Chrysler-Dodge-Plymouth V-8 66-71, 426 Hemi and Keith Black 426, JP-1, BA 426, Rodeck TFX-92**

For .484" shaft diameter

66970-1

## Coated Steel Distributor Gears (continued)

| Application                                      | Part No. |
|--|----------|
| <b>Ford V-8 62-95, 221 thru 302 and Boss 302</b> |          |
| For .467" shaft diameter                         | 36970-1  |
| For .500" shaft diameter                         | 36971-1  |
| For .531" shaft diameter                         | 44970-1  |
| <b>Ford V-8 82-95, 302 H.O. (5.0 litre)</b>      |          |
| For .467" shaft diameter                         | 36970-1  |
| For .500" shaft diameter                         | 36971-1  |
| For .531" shaft diameter                         | 44970-1  |
| <b>Ford V-8 69-00, 351W and 351 SVO</b>          |          |
| For .467" shaft diameter                         | 36970-1  |
| For .500" shaft diameter                         | 36971-1  |
| For .531" shaft diameter                         | 44970-1  |
| <b>Ford V-8 70-82, Boss 351-351C-351M-400</b>    |          |
| For .500" shaft diameter                         | 52970-1  |
| For .531" shaft diameter                         | 52971-1  |
| <b>Ford V-8 58-76, 332 thru 428</b>              |          |
| For .467" shaft diameter                         | 34970-1  |
| For .500" shaft diameter                         | 52970-1  |
| For .531" shaft diameter                         | 52971-1  |
| <b>Ford V-8 68-97, 370-429-460 (7.5 litre)</b>   |          |
| For .500" shaft diameter                         | 52970-1  |
| For .531" shaft diameter                         | 52971-1  |

## Fuel System Accessories

### Fuel Pump Pushrods

Crane's heat treated tubular steel fuel pump pushrods for Chevrolet "small-block" and "big-block" V-8 engines are centerless ground for concentricity. They are also much lighter than solid steel O.E. type pushrods, while maintaining the strength and stiffness required for reliability in severe usage applications.

Part number **11986-1** is for hydraulic and mechanical "**cast**" type camshafts. Both ends of this pushrod are steel tipped for best wear characteristics for quality stock engine rebuilds!

Part number **11985-1** is specifically for use with **8620 and 9310 steel billet roller and slot hardfaced steel camshafts**. One end of the pushrod has a bronze tip to compatibly bear against the fuel pump eccentric on the camshaft, eliminating the wear problems that occur when using a standard fuel pump pushrod (especially in endurance type applications).

| Application                              | Part No. |
|--|----------|
| <b>Chevrolet V-8 55-95, 262 thru 400</b> |          |
| For cast camshafts                       | 11986-1  |
| <b>Chevrolet V-8 55-95, 262 thru 400</b> |          |
| For 8620 steel camshafts                 | 11985-1  |
| <b>Chevrolet V-8 58-65, 348 thru 409</b> |          |
| For cast camshafts                       | 11986-1  |
| <b>Chevrolet V-8 58-65, 348 thru 409</b> |          |
| For 8620 steel camshafts                 | 11985-1  |
| <b>Chevrolet V-8 65-90, 396 thru 454</b> |          |
| For cast camshafts                       | 11986-1  |
| <b>Chevrolet V-8 65-90, 396 thru 454</b> |          |
| For 8620 steel camshafts                 | 11985-1  |

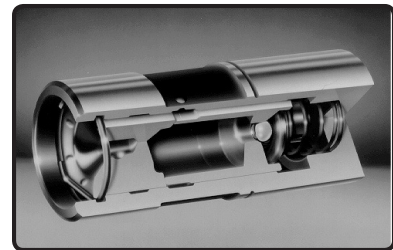


# Lifters - Hydraulic and Mechanical

## "Anti-Pump Up" Performance Hydraulic Lifters

Hydraulic lifters compensate for changes occurring within the valve train. Crane Cams' precision made "Anti-Pump Up" lifters allow the engine to reach its maximum RPM potential (with the correct cam and components). The "bleed rate" of this lifter is maintained by micro tolerances that prevent pump-up and limiting of full RPM potential. After proper preload has been set, hydraulic lifters seldom need maintenance.

**Maximum RPM Potential: 6,500 to 7,000 RPM.**



*Crane Cams performance hydraulic lifters offer precise oil metering and control. Our exclusive internal valving prevents hydraulic lifter "pump-up" with performance camshaft profiles, even at high RPM.*

## Hi Intensity Hydraulic Lifters

Crane Hi Intensity lifters produce a "variable duration effect." At lower RPM this can reduce running duration by 6° to 10° and decrease valve lift by .020" to .030". Hi Intensity lifters work best with a cam that requires more compression ratio than the engine actually has. Hi Intensity lifters restore vacuum, cylinder pressure and bottom end performance. As RPM increases, these lifters act more like a normal hydraulic lifter. At 2500 to 3000 RPM they will transmit the full duration and lift of the cam.

Use only if the engine's compression ratio is below the minimum recommended on the application page for the cam you have chosen. Hi Intensity lifters can cause "low speed detonation" if compression is too high. Slightly more noisy than standard lifters (NOT as noisy as a mechanical cam) and can trigger knock sensors.

**Maximum RPM Potential: 6,500 to 7,000 RPM.**



*Crane Hi Intensity lifters produce maximum performance with minimal noise. They offer increased vacuum, torque and overall power with near stock valve train noise.*

## Mechanical ("Solid") Lifters

Mechanical "solid" lifters should be used in applications when hydraulic cams would surpass their maximum RPM potential. Mechanical lifters have no hydraulic mechanism to pump-up. Theoretically, with the correct cam and engine components, a mechanical lifter cam has an RPM potential of 8000 to 8500 RPM

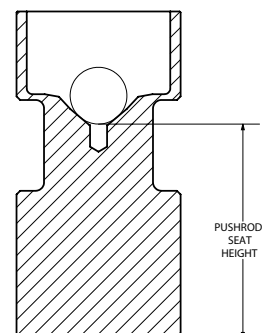
Mechanical lifters are noisier than hydraulics. The engine must have an adjustable valve train system. Valve lash must be set, periodically checked, and maintained. (Can NOT be used on a hydraulic design cam.)



*Crane mechanical lifters are precision machined from finest quality alloyed materials to be metallurgically compatible with cam lobes.*

## Pushrod Seat Heights

The pushrod seat heights listed are measured from the bottom face of the lifter to the bottom of the pushrod seat. The hydraulic lifters are measured without any preload.



# Lifters - Hydraulic and Mechanical



| Application   | Lifter Body Dia. | "Anti-Pump-Up" Hydraulic Lifters Part Number | Pushrod Seat Height | Hi Intensity Hydraulic Lifters Part Number | Pushrod Seat Height | Mechanical Lifters Part Number | Pushrod Seat Height |
|---|------------------|--|---------------------|--|---------------------|--------------------------------|---------------------|
| <b>American Motors - AMC Jeep 64-05 I-6, 199 thru 258</b>           | .904"            | 99278-12                                     | 1.580"              |  |                     | 99260-12                       | 1.485"              |
| <b>American Motors - AMC Jeep 66-91 V-8, 290 thru 401</b>           | .904"            | 99278-16                                     | 1.580"              | 99378-16*                                  | 1.515"              | 99260-16                       | 1.485"              |
| <b>Buick 62-86 V-6, 196 thru 252</b>                                | .842"            | 99284-12                                     | 1.755"              | 99384-12*                                  | 1.655"              | 99250-12                       | 1.560"              |
| <b>Buick 64-80 V-8, 300 thru 350</b>                                | .842"            | 99284-16                                     | 1.755"              | 99384-16*                                  | 1.655"              | 99250-16                       | 1.560"              |
| <b>Buick 67-76 V-8, 400 thru 455</b>                                | .842"            | 99284-16                                     | 1.755"              | 99384-16*                                  | 1.655"              | 99250-16                       | 1.560"              |
| <b>Cadillac 68-81 V-8, 368 thru 500</b>                             | .842"            | 99284-16                                     | 1.755"              | 99384-16*                                  | 1.655"              | 99250-16                       | 1.560"              |
| <b>Chevrolet 62-71 I-4, 153</b>                                     | .842"            | 99277-8                                      | 1.690"              |  |                     | 99250-8                        | 1.560"              |
| <b>Chevrolet 62-84 I-6, 194 thru 250 &amp; 292</b>                  | .842"            | 99277-12                                     | 1.690"              |  |                     | 99250-12                       | 1.560"              |
| <b>Chevrolet 80-94 60D V-6, 173(2.8L)-189(3.1L)</b>                 | .842"            | 99286-12                                     | 1.745"              |  |                     | 99250-12                       | 1.560"              |
| <b>Chevrolet 78-86 90D V-6, 200 thru 262</b>                        | .842"            | 99277-12                                     | 1.690"              |  |                     | 99250-12                       | 1.560"              |
| <b>Chevrolet 55-95 V-8, 262 thru 400</b>                            | .842"            | 99277-16                                     | 1.690"              | 99377-16*                                  | 1.620"              | 99250-16                       | 1.560"              |
| <b>Chevrolet 58-65 V-8, 348-409-427(Z-11)</b>                       | .842"            | 99277-16                                     | 1.690"              | 99377-16*                                  | 1.620"              | 99250-16                       | 1.560"              |
| <b>Chevrolet 65-90 V-8, 396 thru 454 &amp; 502</b>                  | .842"            | 99277-16                                     | 1.690"              | 99377-16*                                  | 1.620"              | 99250-16                       | 1.560"              |
| <b>Chrysler-Dodge-Plymouth 64-87 "LA" V-8, 273 thru 360</b>         | .904"            | 99278-16                                     | 1.580"              | 99378-16*                                  | 1.515"              | 99260-16                       | 1.485"              |
| <b>Chrysler-Dodge-Plymouth 58-67 "B" V-8, 350 thru 440</b>          | .904"            |  |                     |  |                     | 99259-16                       | 1.300"              |
| <b>Chrysler-Dodge-Plymouth 68-78 "B" V-8, 383 thru 440</b>          | .904"            | 99278-16                                     | 1.580"              | 99378-16*                                  | 1.515"              | 99259-16                       | 1.300"              |
| <b>Chrysler-Dodge-Plymouth 64-71 V-8, 426 Hemi</b>                  | .904"            | 99278-16                                     | 1.580"              | 99378-16*                                  | 1.515"              | 99259-16                       | 1.300"              |
| <b>Ford-Mercury 60-83 I-6, 144 thru 250</b>                         | .874"            | 99281-12                                     | 1.575"              |  |                     |                                |                     |
| <b>Ford-Mercury 65-96 I-6, 240-300</b>                              | .874"            | 99280-12                                     | 1.710"              |  |                     | 99257-12                       | 1.635"              |
| <b>Ford-Mercury 62-95 V-8, 221 thru 302 &amp; 351W</b>              | .874"            | 99280-16                                     | 1.710"              | 99380-16*                                  | 1.635"              | 99257-16                       | 1.635"              |
| <b>Ford-Mercury 69-82 V-8, Boss 302, Boss 351, 351C, 351M-400</b>   | .874"            | 99280-16                                     | 1.710"              | 99380-16*                                  | 1.635"              | 99257-16                       | 1.635"              |
| <b>Ford-Mercury 58-76 "FE" V-8, 332 thru 428</b>                    | .874"            | 99281-16                                     | 1.575"              | 99381-16*                                  | 1.500"              | 99256-16*                      | 0.150"              |
| <b>Ford-Mercury 68-97 V-8, 370 thru 460</b>                         | .874"            | 99280-16                                     | 1.710"              | 99380-16*                                  | 1.635"              | 99257-16                       | 1.635"              |
| <b>Oldsmobile 64-84 V-8, 260 thru 455</b>                           | .842"            | 99284-16                                     | 1.755"              | 99384-16*                                  | 1.655"              | 99250-16                       | 1.560"              |
| <b>Pontiac 77-89 I-4, 151(2.5L)</b>                                 | .842"            | 99284-8                                      | 1.755"              |  |                     | 99250-8                        | 1.560"              |
| <b>Pontiac 55-81 V-8, 287 thru 455 (except 77-81 265 &amp; 301)</b> | .842"            | 99282-16                                     | 1.760"              | 99382-16*                                  | 1.680"              | 99255-16                       | 1.570"              |
| <b>Pontiac 77-81 V-8, 265 &amp; 301</b>                             | .842"            | 99277-16                                     | 1.690"              | 99377-16*                                  | 1.620"              | 99250-16                       | 1.560"              |
| <b>Rover 68-00 V-8, 215(3.5L)-240(3.9L)-4.2L</b>                    | .842"            | 99284-16                                     | 1.755"              | 99384-16*                                  | 1.655"              | 99250-16                       | 1.560"              |

a Shell type

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

# Lifters - Hydraulic Roller

## Hydraulic Roller

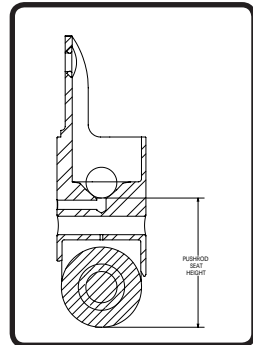
Crane hydraulic roller lifters are offered in two basic designs: Those for use with standard factory alignment bars (on engines originally equipped with hydraulic roller lifters); and vertical locking bar drop-in lifters (designed to retrofit engines not factory equipped with hydraulic roller lifters).

The Chevrolet standard alignment bar lifters are available in a normal dimensioned version, intended for use with standard lobe lift and standard base circle diameter cams. When lobe lifts increase, and base circle diameters decrease, our exclusive long body design lifters must be used to prevent the lifters from dropping out of the factory alignment bars when on the base circle of the camshaft. This would allow the lifters to rotate, causing severe engine damage. As these lifters are for engines originally equipped with hydraulic roller lifters, special length pushrods are not usually required.

Our retrofit vertical locking bar lifters are available for non-hydraulic roller equipped engines.. They can also be used in many applications to replace factory hydraulic roller lifters and alignment mechanisms. No machining is normally required for the drop-in installation of these lifters, however with differences in block castings and camshaft base circle diameters, care must be taken to insure that neither the locking bar, or its attaching rivets, contact the block casting throughout their normal cycles. If there is any interference, the block can usually be ground to provide the necessary clearance. This should be checked prior to final engine assembly. When used in retrofit applications, special length pushrods are required.

The retrofit vertical locking bar lifters are machined from 8620 steel billet, heat treated, and assembled at our own facilities. Precision fit plunger assemblies are used to provide proper bleed-down rates, permitting high RPM use in properly set-up engines. The additional inherent strength of the 8620 material also maintains greater stability in the lifter body, permitting more consistent operation in very high spring pressure and high RPM applications, by keeping the plunger to body clearance consistent throughout the operation range. Retrofit lifters also utilize our latest Monel pin and retaining flange assembly to attach the guidebar, providing superior long term durability.

Each lifter has its pushrod seat height listed. This is the measurement from the bottom of the pushrod seat, to the bottom face of the lifter. For hydraulic lifters, this is the measurement with no (zero) lifter preload. You can check or compare your lifters to these dimensions by placing a 5/16" diameter ball in the pushrod seat, and measuring from the bottom of the lifter to the top of the ball. Then subtract the 5/16" diameter of the ball, obtaining the seat height.



VALVE TRAIN

| Application  | Lifter Body Dia. | Follower Wheel Dia. | Pushrod Seat Height | O.E. Replacement Part No. | Crane Classic Part No. |
|--|------------------|---------------------|---------------------|---------------------------|------------------------|
| <b>American Motors/Jeep V-8 66-91, 290-304-343-360 (5.9L)-390-401 cu.in.</b><br>Vertical locking bar design. No machining required for installation.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i> | .904"            | .700"               | 2.320"              |                           | 86532-16 <sup>a</sup>  |
| <b>Chevrolet V-8 55-87, 262-283-302-305-307-327-350-400 cu.in.</b><br>Vertical locking bar design to retrofit pre-hydraulic roller blocks. No machining required for installation.<br><i>NOTE: Requires special length pushrods 11628-16</i>         | .842"            | .700"               | 2.320"              |                           | 11532-16 <sup>a</sup>  |
| Vertical locking bar design to retrofit pre-hydraulic roller blocks. For .904" diameter lifter bores (machining required).<br><i>NOTE: Requires special length pushrods 11628-16</i>   | .904"            | .700"               | 2.320"              |                           | 11562-16 <sup>a</sup>  |
| <b>Chevrolet V-8 87-99, 305 and 350 cu.in. and LS1 5.7L</b><br>O.E. replacement for 87-99 blocks originally equipped with hydraulic roller cam and lifters. For use with standard GM alignment bars.   | .842"            | .700"               | 2.340"              | 10530-16 <sup>a</sup>     |                        |
| Long body design for 87-99 blocks originally equipped with hydraulic roller cam and lifters.<br>A necessity when camshafts have greater than stock lobe lift or reduced base circle diameter. For use with standard GM alignment bars.               | .842"            | .700"               | 2.320"              |                           | 10535-16 <sup>a</sup>  |
| <b>Chevrolet V-8 2000-up, 5.7L LS1/LS6 &amp; Vortec 4800, 5300, 6000</b><br>O.E. replacement for 2000-up blocks originally equipped with hydraulic roller cam and lifters. For use with standard GM alignment bars.                                  | .842"            | .700"               | 2.340"              | 144530-16 <sup>a</sup>    |                        |
| Long body design for 2000-up blocks originally equipped with hydraulic roller cam & lifters.<br>A necessity when camshafts have greater than stock lobe lift or reduced base circle diameter. For use with standard GM alignment bars.               | .842"            | .700"               | 2.320"              |                           | 144536-16 <sup>a</sup> |
| Vertical locking bar, long travel design. No machining required for installation.  | .842"            | .700"               | 2.320"              |                           | 144532-16 <sup>a</sup> |
| Vertical locking bar, long travel design for Warhawk blocks. No machining required for installation.   | .842"            | .700"               | 2.320"              |                           | 144533-16 <sup>a</sup> |
| <b>Chevrolet V-8 58-65, 348-409-427 (Z-11) cu.in.</b><br>Vertical locking bar design. No machining required for installation.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>                        | .842"            | .700"               | 2.320"              |                           | 11532-16 <sup>a</sup>  |

Section Continued



## Hydraulic Roller

| Application   | Lifter Body Dia. | Follower Wheel Dia. | Pushrod Seat Height | O.E. Replacement Part No. | Crane Classic Part No. |
|---|------------------|---------------------|---------------------|---------------------------|------------------------|
| <b>Chevrolet V-8 65-95, 396-402-427-454-502 cu.in.</b><br>Vertical locking bar design to retrofit pre-hydraulic roller blocks. No machining required for installation.<br><i>NOTE: Requires special length pushrods 13628-16 for standard deck block, or 13629-16 for +.400" tall deck block.</i>   | .842"            | .700"               | 2.320"              |                           | 13532-16 <sup>a</sup>  |
| Vertical locking bar design to retrofit pre-hydraulic roller blocks. For .904" diameter lifter bores (machining required).<br><i>NOTE: Requires special length pushrods 13628-16 for standard deck block, or 13629-16 for +.400" tall deck block.</i>   | .904"            | .700"               | 2.320"              |                           | 13562-16 <sup>a</sup>  |
| <b>Chevrolet V-8 96-00, 454-502 cu.in. Gen VI</b><br>Long body design for 96-00 blocks originally equipped with hydraulic roller cam and lifters. A necessity when camshafts have greater than stock lobe lift or reduced base circle diameter. For use with standard GM alignment bars.  | .842"            | .700"               | 2.320"              |                           | 26535-16 <sup>a</sup>  |
| <b>Chevrolet V-8 01-08, 8.1 Litre (8100)</b><br>Long body design. A necessity when camshafts have greater than stock lobe lift or reduced base circle diameter. For use with standard GM alignment bars.  | .842"            | .700"               | 2.320"              |                           | 26535-16 <sup>a</sup>  |
| <b>Chrysler V-8 51-58, 301-331-354-392 cu.in.</b><br>Vertical locking bar design. No machining required for installation.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>   | .904"            | .700"               | 2.320"              |                           | 68532-16 <sup>a</sup>  |
| <b>Chrysler-Dodge-Plymouth V-8 64-87, "LA" 273-318-340-360 cu.in.</b><br>Vertical locking bar design. Machining not normally required for installation. However, some 340-360 blocks may require modification for guidebar clearance, while early 273 and some aftermarket cylinder heads may require modification for pushrod clearance.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>       | .904"            | .700"               | 2.320"              |                           | 69532-16 <sup>a</sup>  |
| <b>Chrysler-Dodge-Plymouth V-8 86-91, "LA" 5.2-5.9L &amp; 92-02 Magnum 5.2-5.9L</b><br>O.E. replacement for 86-02 blocks originally equipped with hydraulic roller cam and lifters. For use with standard Chrysler alignment bars.  | .904"            | .700"               | 2.355"              | 70530-16 <sup>a</sup>     |                        |
| <b>Chrysler-Dodge-Plymouth V-8 58-78, "B" 350-361-383-400-426-440 cu.in.</b><br>Vertical locking bar design. No machining required for installation.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>  | .904"            | .700"               | 2.320"              |                           | 68532-16 <sup>a</sup>  |
| <b>Chrysler-Dodge-Plymouth V-8 64-71, Hemi 426 cu.in.</b><br>Vertical locking bar design. No machining required for lifter installation. However, due to the increased pushrod seat height of the Crane retrofit hydraulic roller lifters, the cylinder heads, and possibly the cylinder block, will have to be modified for pushrod clearance.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i> | .904"            | .700"               | 2.320"              |                           | 68532-16 <sup>a</sup>  |
| <b>Ford V-8 62-87, 221 thru 302, Boss 302, and 69-93, 351 Windsor</b><br>Vertical locking bar design to retrofit pre-hydraulic roller blocks. No machining required for installation. Requires cylinder head removal for installation on 221 through 302 and 302 H.O. applications.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>   | .874"            | .700"               | 2.320"              |                           | 36532-16 <sup>a</sup>  |
| <b>Ford V-8 85-00, 302, 302 H.O., 5.0L, and 94-97, 351 Windsor</b><br>O.E. replacement for blocks originally equipped with hydraulic roller cam and lifters. For use with standard Ford alignment bars.   | .874"            | .700"               | 2.320"              | 36530-16 <sup>a</sup>     |                        |
| <b>Ford V-8 70-82, Boss 351-351C-351M-400 cu. in.</b><br>Vertical locking bar design. No machining required for installation.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>   | .874"            | .700"               | 2.320"              |                           | 36532-16 <sup>a</sup>  |
| <b>Ford V-8 63-76, 352 thru 428 cu. in.</b><br>Vertical locking bar design. No machining required for installation.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>   | .874"            | .700"               | 2.320"              |                           | 35532-16 <sup>a</sup>  |
| <b>Ford V-8 68-97, 370-429-460 cu. in. (except Boss 429 Hemi)</b><br>Vertical locking bar design. No machining required for installation.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>   | .874"            | .700"               | 2.320"              |                           | 35532-16 <sup>a</sup>  |
| <b>Ford V-8 69-70, Boss 429 Hemi</b><br>Vertical locking bar design. No machining required for installation.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>  | .874"            | .700"               | 2.320"              |                           | 30532-16 <sup>a</sup>  |
| <b>Oldsmobile V-8 64-84, 260-307 (5.0L)-330-350 (5.7L)-400-403-425-455 cu.in.</b><br>Vertical locking bar design for .842" diameter lifter bores. No machining required for installation.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>   | .842"            | .700"               | 2.320"              |                           | 28532-16 <sup>a</sup>  |
| <b>Pontiac V-8 55-81, 287-316-326-347-350-370-389-400 (6.6L)-421-428-455 cu.in.</b><br>Vertical locking bar design. No machining required for installation. Not for use in 265 (4.3L) or 301 (4.9L) engines.<br><i>NOTE: Requires special length pushrods. See engine application pages for information.</i>  | .842"            | .700"               | 2.320"              |                           | 28532-16 <sup>a</sup>  |

<sup>a</sup> To order spares, you may order any of these lifters in pairs by removing the -16 from the set part number and replacing it with a -2. For example, a 11532-16 set will become a 11532-2 when ordering one pair.

# Lifters - Mechanical Roller

## Mechanical Roller Lifters

Crane roller lifters are the standard by which all others are judged. From our first horizontal locking bar version, with patented roller shield body, to our latest Ultra Pro-Series design, Crane has brought innovation and proven reliability to this critical component. For maximum reliability, pressure-fed oil is routed to the roller wheel and bearings on engines with this oiling system design. This is another Crane pioneered feature.

Another Crane innovation is our use of Bearing Focused Oiling. As many racing engines do not have pressurized oil to the lifter bores, a method is needed to supply oil to the bearing assemblies. This utilizes two passages in the lifter body adjacent to the roller wheel, conducting the oil that is pressed out from between the roller and the camshaft lobe to the roller bearings. There are no small passages that can clog, and no engine oil pressure is sacrificed to provide this lubrication and cooling to the needle bearings. Bearing, roller, and axle life is therefore extended by the benefits of a continuous oil flow over these components.

Due to the proliferation of factory and aftermarket cylinder blocks (which may have relocated camshaft locations, relocated oil galleries, changed lifter boss heights, lifter bores of varied diameters and center-to-center distances, etc.), the manufacture and selection of the proper roller lifter has also become more exacting. This listing includes most popular applications available at the time of publication, but new items are being continuously released. We also offer custom roller lifters to suit specialized block-camshaft-cylinder head combinations. Contact Crane's Performance Consultants if you have any unique requirements.

Our Crane Classic design roller lifters are suitable for virtually all performance applications. Both the horizontal and vertical locking bar versions are used throughout motorsports today. Our Ultra Pro-Series lifters feature maximized lifter bore contact surfaces for less wear, weight removed from non-critical areas, increased body stiffness, and premium materials chosen wherever necessary.

Upgrades to the Ultra Pro-Series lifters include carburized 8620 steel bodies, upgraded materials and metal processing for the roller wheels, needle bearings, and axles. A new guidebar attachment system incorporates a retaining button in conjunction with an aerospace quality monel pin to provide superior clamping forces and resistance to wear. Extreme Spintron and track testing has confirmed this configuration to be superior to anything else on the market today.

All machining, and assembly is performed at our own facilities, insuring absolute accuracy and total quality control. The spring-loaded horizontal locking bar lifters have the unique feature of permitting cam changes without intake manifold removal (providing a rev-kit is not used). Loosening the rocker arms and removing the pushrods allows the springs to pick the lifters up away from the camshaft. The cam can then be removed and replaced in minimal time. This convenience is especially helpful during dyno and on-track testing sessions.

**We do not advise the use of oil restrictors with our roller lifters.** Crane roller lifters are designed for use with normal oiling systems. The needle bearings within are dependent on oil flow to provide lubrication and transfer of the heat generated by today's high valve spring pressures and increased rocker arm ratios. Particularly hard on these components are prolonged periods of idling when oil flow is at a minimum but spring pressures are still high.

Whenever possible, standard pushrod seat height is maintained from the bottom of the wheel so that normal length pushrods are used. In consideration of special geometry applications, the seat may be higher, or lower, than standard for best fitment. These instances are noted in the application description where required. The pushrod socket radius is usually stock, and any deviations are also noted in the application description.

Block machining is not normally required for the installation of these lifters (other than the lifter bore diameter options), however with differences in block castings and camshaft base circle diameters, care must be taken to ensure that the lifter, locking bar, and locking bar attaching rivets (where applicable), do not encounter any bind, or unwanted contact, throughout their normal cycles. If there is any interference, the block can usually be ground to provide the necessary clearance. This should be checked prior to final engine assembly.



Horizontal Guide Bar — Crane Classic Design

## Mechanical Roller Lifters (continued)

**We do not advise the use of offset pushrod seat roller lifters, when the pushrod angle imparts rotational forces upon the lifter.** Offset roller lifters are acceptable for use when the pushrods are angled to the front or rear of the engine (parallel to the camshaft). If the pushrods lean toward the left or right of the lifter bores (as viewed from the front or rear of the engine), this will put severe loads on the lifter guidebar and its attaching mechanism, which can lead to decreased reliability and possible failure. When building a serious racing engine, it's advisable to avoid using offset lifters whenever possible. Offset lifters can also be responsible for accelerated wear to the lifter bores, lifter bodies, roller wheel/bearings/axles, and cam lobes. Plan ahead when choosing and preparing your cylinder block and heads, so you can use centered lifters for best reliability.



Vertical Guide Bar — Crane Classic Design

## Choose The Right Crane Roller Lifters for Your Application

### Crane Classic Design or Ultra-Pro™ Roller Lifters?

With the release of Crane Cams new **Ultra-Pro™** series of roller lifters, you might be wondering just which series of lifters is right for your application. Listed below are some guidelines for making the correct choice and getting “the best performance for your dollar”.

**Crane Classic Design** Crane roller lifters were developed when camshaft lobes were not nearly as violent as today. They are ideal for street-rollers, many bracket-race type applications and other racing uses where cam profiles aren't as aggressive. Made of carburized (heat treated) 8620 alloy steel, these rollers are capable of handling up to 240 lbs., of valve spring seat pressure in bracket race applications and up to 220 lbs., of seat pressure in endurance applications – providing the cam lobe profile is not extremely violent. Open pressures exceeding 600 lbs., are not recommended for these lifters. Crane Classic Design lifters feature high quality wheels and axles that “look alike” lifters do not have. You'll find that the materials, machining tolerances and overall quality of Crane Classic Design roller lifters far exceeds lifters being sold for a lower price. These roller lifters feature all the quality and durability you expect from a Crane Cams product yet they are very economically priced.

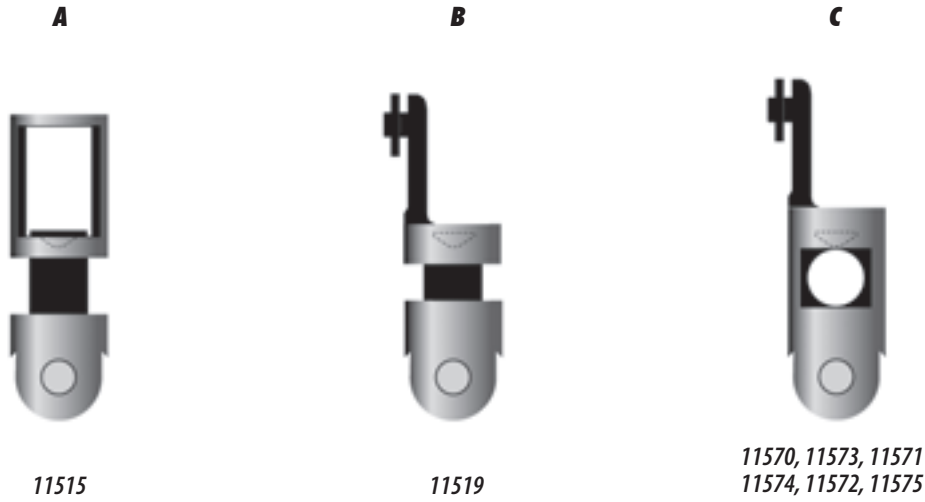
Crane **Ultra-Pro™** roller lifters are the ultimate in state-of-the-art, drop-in design premium quality roller lifters! Empirical design and development techniques have been used to eliminate any distortion effects of residual stresses resulting from the heat treat process. **Ultra-Pro™** roller lifters feature maximized strength; especially in the axle support struts. This insures geometrically perfect tracking of the roller wheel. Additionally, super-premium wheels, axles and bearings made from the finest grades of alloy steels are used to conquer even the most violent cam lobe profiles currently designed or anticipated for the next several years! These lifters represent the best combination of lightweight, ultimate strength and reliability. They should be used in all drag race applications with spring seat pressures in excess of 300 lbs., and open pressures over 800 lbs. In addition, they should be used in any short-track circle or endurance racing application where valve spring seat pressures exceed 250 lbs., and open pressures exceed 700 lbs. Use Crane Cams **Ultra-Pro™ series** lifters when absolute durability is necessary.

With Crane Cams **Ultra-Pro™** roller lifters, engine builders can now be sure that they're using the absolute finest available, professional quality roller lifters for high-stress race engine applications. Count on Crane Cams to give you a full selection of performance products with the best performance for the buck and peace of mind for you.



# Lifters - Mechanical Roller

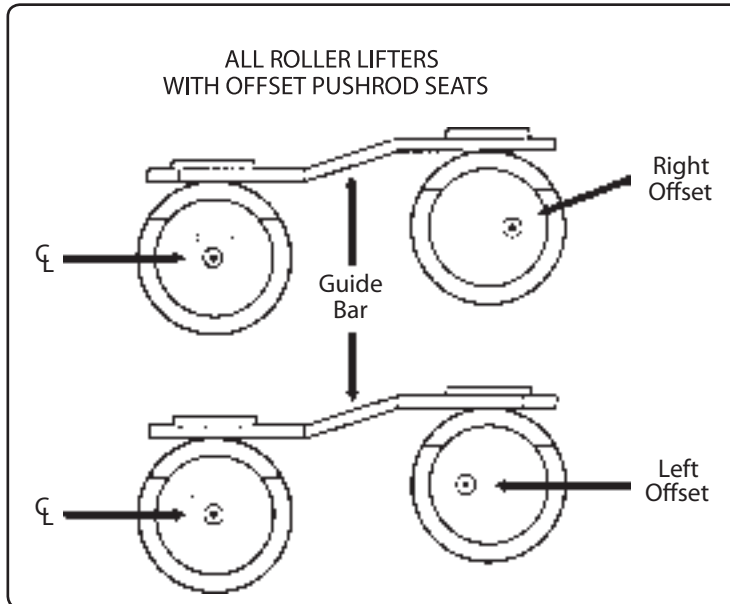
## Choose The Right Crane Roller Lifters for Your Application (continued)



These drawings represent the basic styles of Crane mechanical roller lifters for Chevy 262-400 V-8 type engines and their various heights. Example **A** is the horizontal locking bar (spring-loaded) Crane Classic design. The vertical locking bar version **B** is the Crane Classic design vertical locking bar design. **C** represents the Ultra-Pro Series design, as required for various lifter bore diameters and heights. Refer to the specific Buyer's Guide listing for the proper engine application of each variation.

VALVE TRAIN

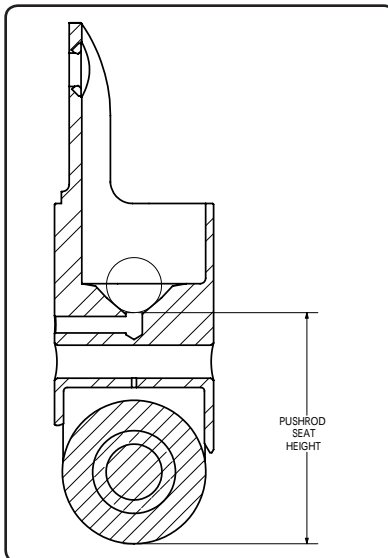
## How to Identify Roller Lifter Offsets



When ordering spare lifters with offset pushrod seat locations you **MUST** specify left or right offset. For example, a pair of lifters for set number 13571-16 would be either 13571L-2 (left) or 13571R-2 (right). See drawing to identify lifter offsets.

Section Continued

## Pushrod Seat Heights



The pushrod seat heights listed are measured from the bottom of the follower wheel to the bottom of the pushrod seat

Crane DOES NOT recommend the use of oil restrictors.

| Application   | Lifter Body Dia. | Follower Wheel Dia. | Pushrod Seat Height | Crane Classic Part No. | Ultra Pro Series Part No. |
|---|------------------|---------------------|---------------------|------------------------|---------------------------|
| <b>American Motors V-8 66-91, 290-304-343-360 (5.9L)-390-401 cu.in.</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar with .200" short pushrod seat location   | .904"            | .815"               | 1.325"              |                        | 66550-16                  |
| <b>Arias/Fontana/MBR V-8, 8.3L</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar  | .904"            | .815"               | 1.325"              |                        | 95542-16                  |
| Vertical locking bar with .120" tall pushrod seat location  | .904"            | .815"               | 1.455"              |                        | 95543-16                  |
| Vertical locking bar will accommodate pushrod oiling  | .904"            | .815"               | 1.325"              |                        | 95550-16                  |
| <b>Brad Anderson 426, Rodeck TFX-92, Keith Black Aluminum 426 V-8, JP-1</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar  | .904"            | .815"               | 1.325"              |                        | 66542-16                  |
| Vertical locking bar with .120" tall pushrod seat location  | .904"            | .815"               | 1.455"              |                        | 66543-16                  |
| Vertical locking bar for spread lifter bore blocks  | .904"            | .815"               | 1.325"              |                        | 95542-16                  |
| Vertical locking bar for spread lifter bore blocks, with .120" tall pushrod seat location   | .904"            | .815"               | 1.455"              |                        | 95543-16                  |
| Vertical locking bar for spread lifter bore cylinder blocks, will accommodate pushrod oiling  | .904"            | .815"               | 1.325"              |                        | 95550-16                  |
| Vertical locking bar for 1.000" diameter lifter bores, with standard to .200" spread lifter bore spacing  | .998"            | .920"               | 1.320"              |                        | 66547-16                  |
| Vertical locking bar for 1.000" diameter lifter bores, with standard to .200" spread lifter bore spacing, with .200" tall pushrod seat location, will accommodate pushrod oiling. | .998"            | .920"               | 1.515"              |                        | 66555-16                  |
| Vertical locking bar for 1.062" diameter lifter bores, with standard to .200" spread lifter bore spacing, with .200" tall pushrod seat location.                                  | 1.060"           | .920"               | 1.520"              |                        | 66549-16                  |
| <b>Buick/Dart Race Head V-8, 302-350 cu. in.</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar for .842" diameter lifter bores, with .180" offset left intake and exhaust pushrod seats   | .842"            | .750"               | 1.575"              |                        | X1057L-2                  |
| Vertical locking bar for .875" diameter lifter bores, with .180" offset left intake and exhaust pushrod seats   | .874"            | .750"               | 1.575"              |                        | X1061L-2                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset left intake and exhaust pushrod seats   | .904"            | .815"               | 1.595"              |                        | X1269L-2                  |
| <b>Chevrolet 90° V-6 78-86, 200-229-262 (4.3L) cu. in.</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar for H.D. aluminum cylinder block or iron blocks with V-8 type lifter bore oiling   | .842"            | .750"               | 1.575"              | 11519-2                |                           |

# Lifters - Mechanical Roller

| Application   | Lifter Body Dia. | Follower Wheel Dia. | Pushrod Seat Height | Crane Classic Part No. | Ultra Pro Series Part No. |
|---|------------------|---------------------|---------------------|------------------------|---------------------------|
| <b>Crane DOES NOT recommend the use of oil restrictors.</b>   |                  |                     |                     |                        |                           |
| <b>Chevrolet V-8 55-00, 262-400 cu. in., GM Bow Tie, Donovan, Rodeck (except LS1 and SB2)</b>   |                  |                     |                     |                        |                           |
| Horizontal locking bar  | .842"            | .750"               | 1.575"              | 11515-16               |                           |
| Vertical locking bar for standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks   | .842"            | .750"               | 1.575"              | 11519-16               | 11570-16                  |
| Vertical locking bar for blocks with 55mm, or greater, oversize journal camshafts   | .842"            | .750"               | 1.575"              |                        | 11576-16                  |
| Vertical locking bar with .180" offset left and right intake pushrod seats, for standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks  | .842"            | .750"               | 1.575"              |                        | 11571-16                  |
| Vertical locking bar with .180" offset left and right intake pushrod seats, for blocks with 55mm, or greater, oversize journal camshafts  | .842"            | .750"               | 1.575"              |                        | 11577-16                  |
| Vertical locking bar for Chevrolet Splayed Valve cylinder heads, with .180" offset left and right intake and exhaust pushrod seats, for standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks                                  | .842"            | .750"               | 1.575"              |                        | 8 of X1021-2              |
| Vertical locking bar for .875" diameter lifter bores, in standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks   | .874"            | .750"               | 1.575"              |                        | 11572-16                  |
| Vertical locking bar for .875" diameter lifter bores, for standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks, with .180" offset left and right intake pushrod seats   | .874"            | .750"               | 1.575"              |                        | 11573-16                  |
| Vertical locking bar for .875" diameter lifter bores, for Chevrolet Splayed Valve cylinder heads, with .180" offset left and right intake and exhaust pushrod seats, for standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks | .874"            | .750"               | 1.575"              |                        | 8 of X1062-2              |
| Vertical locking bar for .904" diameter lifter bores, for standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks  | .904"            | .815"               | 1.595"              |                        | 11574-16                  |
| Vertical locking bar for .904" diameter lifter bores, for blocks with 55mm, or greater, oversize journal camshafts  | .904"            | .815"               | 1.595"              |                        | 11578-16                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset left and right intake pushrod seats, for standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks   | .904"            | .815"               | 1.595"              |                        | 11575-16                  |
| Vertical locking bar for .904" diameter lifter bores, for Chevrolet Splayed Valve cylinder heads with .210" offset left and right intake and exhaust pushrod seats, for standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks  | .904"            | .815"               | 1.595"              |                        | 8 of X1274-2              |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset left and right intake pushrod seats for blocks with 55mm, or greater, oversize journal camshafts  | .904"            | .815"               | 1.595"              |                        | 11579-16                  |
| <b>Chevrolet V-8 55-00, 262-400 cu.in. with SB2 cylinder heads</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar with .180" offset left and right pushrod seats, for standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks   | .842"            | .750"               | 1.575"              |                        | 138571-16                 |
| Vertical locking bar for .875" diameter lifter bores, with .180" offset left and right pushrod seats, for standard or tall lifter bore Bow Tie, hydraulic roller or aftermarket cylinder blocks   | .874"            | .750"               | 1.575"              |                        | 138573-16                 |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset left and right pushrod seats, for standard or tall lifter bore Bow Tie, hydraulic roller, or aftermarket cylinder blocks  | .904"            | .815"               | 1.595"              |                        | 138575-16                 |
| <b>Chevrolet V-8 88-00, 305-350 cu. in., LS1 5.7L (except SB2)</b>  |                  |                     |                     |                        |                           |
| Long body design for use with standard GM alignment bars, in engines originally equipped with hydraulic roller lifters  | .842"            | .700"               | 2.310"              | 10510-16               |                           |

Section Continued 

# Lifters - Mechanical Roller



Crane DOES NOT recommend the use of oil restrictors.

| Application   | Lifter Body Dia. | Follower Wheel Dia. | Pushrod Seat Height | Crane Classic Part No. | Ultra Pro Series Part No. |
|---|------------------|---------------------|---------------------|------------------------|---------------------------|
| <b>Chevrolet V-8 2000-up, 5.7L LS1/LS2, LS3/L92, LS6 &amp; Vortec 4800, 5300, 6000</b>  |                  |                     |                     |                        |                           |
| Long body design for use with standard GM alignment bars, in engines originally equipped with hydraulic roller lifters  | .842"            | .700"               | 2.310"              | 144511-16              |                           |
| Vertical locking bar, long body design, for increased lift and reduced base circle camshafts  | .842"            | .750"               | 1.575"              |                        | 144570-16                 |
| Vertical locking bar, long body design, for Warhawk blocks, for increased lift and reduced base circle camshafts.   | .842"            | .750"               | 1.575"              |                        | 144572-16                 |
| <b>Chevrolet V-8 98-05, 5.7L SB2 (for canted lifter bore blocks)</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar  | .842"            | .750"               | 1.575"              |                        | 123570-16                 |
| Vertical locking bar with .180" offset left and right intake pushrod seats  | .842"            | .750"               | 1.575"              |                        | 123571-16                 |
| Vertical locking bar for .875" diameter lifter bores  | .874"            | .750"               | 1.575"              |                        | 123572-16                 |
| Vertical locking bar for .875" diameter lifter bores, with .180" offset left and right intake pushrod seats   | .874"            | .750"               | 1.575"              |                        | 123573-16                 |
| <b>Chevrolet V-8 58-65, 348-409-427 (Z-11) cu.in.</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar  | .842"            | .750"               | 1.575"              | 15519-16               |                           |
| <b>Chevrolet V-8 65-00, 396-402-427-454-502 cu.in. (including Gen V and Gen VI), Donovan, Rodeck 481</b>  |                  |                     |                     |                        |                           |
| Horizontal locking bar—must use 3/8" diameter pushrods  | .842"            | .750"               | 1.575"              | 13515-16               |                           |
| Vertical locking bar for standard or tall lifter bore cylinder blocks   | .842"            | .750"               | 1.575"              | 13519-16               | 13570-16                  |
| Vertical locking bar for blocks with 55mm, or greater, oversize journal camshafts   | .842"            | .750"               | 1.575"              |                        | 13576-16                  |
| Vertical locking bar with .180" offset left and right intake pushrod seats, for standard or tall lifter bore cylinder blocks  | .842"            | .750"               | 1.575"              |                        | 13571-16                  |
| Vertical locking bar with .180" offset left and right intake pushrod seats, for blocks with 55mm, or greater, oversize journal camshafts                                  | .842"            | .750"               | 1.575"              |                        | 13577-16                  |
| Vertical locking bar for .875" diameter lifter bores, for standard or tall lifter bore cylinder blocks  | .874"            | .750"               | 1.575"              |                        | 13572-16                  |
| Vertical locking bar for .875" diameter lifter bores, for standard or tall lifter bore cylinder blocks, with .180" offset left and right intake pushrod seats             | .874"            | .750"               | 1.575"              |                        | 13573-16                  |
| Vertical locking bar for .904" diameter lifter bores, for standard or tall lifter bore cylinder blocks  | .904"            | .815"               | 1.595"              |                        | 13574-16                  |
| Vertical locking bar for .904" diameter lifter bores, for blocks with 55mm, or greater, oversize journal camshafts  | .904"            | .815"               | 1.595"              |                        | 13578-16                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset left and right intake pushrod seats, for standard or tall lifter bore cylinder blocks             | .904"            | .815"               | 1.595"              |                        | 13575-16                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset left and right intake pushrod seats, for blocks with 55mm, or greater, oversize journal camshafts | .904"            | .815"               | 1.595"              |                        | 13579-16                  |
| <b>Chevrolet V-8 96-00, 454 (7.4L)-502 (8.2L) cu.in. Gen VI</b>   |                  |                     |                     |                        |                           |
| Long body design for use with standard GM alignment bars in engines originally equipped with hydraulic roller lifters   | .842"            | .700"               | 2.310"              | 16510-16               |                           |

# Lifters - Mechanical Roller

Crane DOES NOT recommend the use of oil restrictors.

| Application  | Lifter Body Dia. | Follower Wheel Dia. | Pushrod Seat Height | Crane Classic Part No. | Ultra Pro Series Part No. |
|--|------------------|---------------------|---------------------|------------------------|---------------------------|
| <b>Chrysler V-8 51-58, 301-331-354-392 cu.in.</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar   | .904"            | .750"               | 1.460"              | 66515-16               |                           |
| Vertical locking bar   | .904"            | .815"               | 1.325"              |                        | 66542-16                  |
| Vertical locking bar with .120" tall pushrod seat location   | .904"            | .815"               | 1.455"              |                        | 66543-16                  |
| <b>Chrysler-Dodge-Plymouth V-8 64-00, "LA" 273-318-340-360 cu.in. (No lifter bore oiling modifications required)</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar   | .904"            | .750"               | 1.460"              | 69515-16               |                           |
| Vertical locking bar   | .904"            | .815"               | 1.325"              |                        | 69542-16                  |
| Vertical locking bar will accommodate pushrod oiling   | .904"            | .815"               | 1.325"              |                        | 69550-16                  |
| Vertical locking bar for tall lifter bore cylinder blocks, with .400" tall pushrod seat location   | .904"            | .815"               | 1.725"              |                        | 69554-16                  |
| <b>Chrysler-Dodge-Plymouth V-8, "LA" R-block 318-360 cu.in. w/ 48° lifter bank angle (R-blocks having 59° lifter bank angles are not intended for use w/ roller camshafts)</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar will accommodate pushrod oiling   | .904"            | .815"               | 1.325"              |                        | 69552-16                  |
| <b>Chrysler-Dodge-Plymouth V-8 58-78, "B" 350-361-383-400-426-440 cu.in. (No lifter bore oiling modifications required)</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar   | .904"            | .750"               | 1.460"              | 66515-16               |                           |
| Vertical locking bar   | .904"            | .815"               | 1.325"              |                        | 66542-16                  |
| Vertical locking bar with .120" tall pushrod seat location   | .904"            | .815"               | 1.455"              |                        | 66543-16                  |
| Vertical locking bar will accommodate pushrod oiling   | .904"            | .815"               | 1.325"              |                        | 66550-16                  |
| Vertical locking bar for tall lifter bore cylinder blocks, with .400" tall pushrod seat location   | .904"            | .815"               | 1.725"              |                        | 66554-16                  |
| <b>Chrysler-Dodge-Plymouth V-8 64-71, Hemi 426 cu.in. (also see Keith Black roller lifter listings) (No lifter bore oiling modifications required)</b>                           |                  |                     |                     |                        |                           |
| Vertical locking bar   | .904"            | .750"               | 1.460"              | 66515-16               |                           |
| Vertical locking bar   | .904"            | .815"               | 1.325"              |                        | 66542-16                  |
| Vertical locking bar with .120" tall pushrod seat location   | .904"            | .815"               | 1.455"              |                        | 66543-16                  |
| Vertical locking bar will accommodate pushrod oiling   | .904"            | .815"               | 1.325"              |                        | 66550-16                  |
| Vertical locking bar for tall lifter bore cylinder blocks with .400" tall pushrod seat location  | .904"            | .815"               | 1.725"              |                        | 66554-16                  |
| Vertical locking bar for 1.000" diameter lifter bores, with standard to .200" spread lifter bore spacing, with .200" tall pushrod seat location, will accommodate pushrod oiling | .998"            | .920"               | 1.515"              |                        | 66555-16                  |
| <b>Donovan V-8, 417 cu.in.</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar   | .904"            | .750"               | 1.460"              | 66515-16               |                           |
| Vertical locking bar   | .904"            | .815"               | 1.325"              |                        | 66542-16                  |
| Vertical locking bar with .120" tall pushrod seat location   | .904"            | .815"               | 1.455"              |                        | 66543-16                  |
| Vertical locking bar for 1.000" diameter lifter bores, with standard to .200" spread lifter bore spacing, with .200" tall pushrod seat location, will accommodate pushrod oiling | .998"            | .920"               | 1.515"              |                        | 66555-16                  |

VALVE TRAIN



# Lifters - Mechanical Roller



Crane DOES NOT recommend the use of oil restrictors.

| Application   | Lifter Body Dia. | Follower Wheel Dia. | Pushrod Seat Height | Crane Classic Part No. | Ultra Pro Series Part No. |
|---|------------------|---------------------|---------------------|------------------------|---------------------------|
| <b>Ford V-8 62-00, 221-255 (4.2L)-260-289-302-5.0L, 5.0L H.O., Boss 302, 351W cu.in.</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              | 44518-16               |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              |                        | 44570-16                  |
| Vertical locking bar with .180" offset right intake pushrod seats   | .874"            | .750"               | 1.720"              |                        | 44571-16                  |
| Vertical locking bar for .904" diameter lifter bores  | .904"            | .815"               | 1.720"              |                        | 44574-16                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset right intake pushrod seats                                      | .904"            | .815"               | 1.720"              |                        | 44575-16                  |
| <b>Ford V-8 70-82, Boss 351-351C- 351M-400 cu.in.</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              | 44518-16               |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              |                        | 44570-16                  |
| Vertical locking bar with .180" offset right intake pushrod seats   | .874"            | .750"               | 1.720"              |                        | 44571-16                  |
| Vertical locking bar for .904" diameter lifter bores  | .904"            | .815"               | 1.720"              |                        | 44574-16                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset right intake pushrod seats                                      | .904"            | .815"               | 1.720"              |                        | 44575-16                  |
| <b>Ford V-8, SVO 302 and SVO 351</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              | 44518-16               |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              |                        | 44570-16                  |
| Vertical locking bar with .180" offset right intake pushrod seats   | .874"            | .750"               | 1.720"              |                        | 44571-16                  |
| Vertical locking bar for .904" diameter lifter bores  | .904"            | .815"               | 1.720"              |                        | 44574-16                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset right intake pushrod seats                                      | .904"            | .815"               | 1.720"              |                        | 44575-16                  |
| <b>Ford V-8 63-76, 352-360-390-406-410-427-428 cu.in.</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              | 30518-16               |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              |                        | 35570-16                  |
| Vertical locking bar with .180" offset left and right intake pushrod seats  | .874"            | .750"               | 1.720"              |                        | 35571-16                  |
| Vertical locking bar for .904" diameter lifter bores  | .904"            | .815"               | 1.720"              |                        | 35574-16                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset left and right intake pushrod seats                             | .904"            | .815"               | 1.720"              |                        | 35575-16                  |
| <b>Ford V-8 68-97, 370-429-460 cu.in. (except 429 Boss Hemi)</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              | 30518-16               |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              |                        | 35570-16                  |
| Vertical locking bar with .180" offset left and right intake pushrod seats  | .874"            | .750"               | 1.720"              |                        | 35571-16                  |
| Vertical locking bar with .180" offset right intake pushrod seats, for Ford Racing C460 cylinder heads                                  | .874"            | .750"               | 1.720"              |                        | 35571R-16                 |
| Vertical locking bar for .904" diameter lifter bores  | .904"            | .815"               | 1.720"              |                        | 35574-16                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset left and right intake pushrod seats                             | .904"            | .815"               | 1.720"              |                        | 35575-16                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset right intake pushrod seats, for Ford Racing C460 cylinder heads | .904"            | .815"               | 1.720"              |                        | 35575R-16                 |
| <b>Ford V-8 69-70, 429 Boss Hemi</b>  |                  |                     |                     |                        |                           |
| Vertical locking bar  | .874"            | .750"               | 1.720"              |                        | 30570-16                  |
| Vertical locking bar for .904" diameter lifter bores  | .904"            | .815"               | 1.720"              |                        | 30574-16                  |

# Lifters - Mechanical Roller

Crane DOES NOT recommend the use of oil restrictors.

| Application   | Lifter Body Dia. | Follower Wheel Dia. | Pushrod Seat Height | Crane Classic Part No. | Ultra Pro Series Part No. |
|---|------------------|---------------------|---------------------|------------------------|---------------------------|
| <b>Johnson/Rodeck V-8, 481X</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar for .904" diameter lifter bores with pushrod oiling  | .904"            | .815"               | 1.385"              |                        | 140550-16                 |
| <b>Oldsmobile V-8 64-84, 260-307 (5.0L) -330-350 (5.7L) -400-403-425-455 cu.in.</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar for .842" diameter lifter bores  | .842"            | .750"               | 1.705"              |                        | 28570-16                  |
| <b>Pontiac V-8 55-81, 287-316-326-347-350-370-389-400 (6.6L)-421-428-455 cu.in.</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar  | .842"            | .750"               | 1.705"              |                        | 28570-16                  |
| <b>Rodeck V-8, 481 cu.in. (except 481X)</b>   |                  |                     |                     |                        |                           |
| Vertical locking bar  | .842"            | .750"               | 1.575"              |                        | 13570-16                  |
| Vertical locking bar with .180" offset left and right intake pushrod seats  | .842"            | .750"               | 1.575"              |                        | 13571-16                  |
| Vertical locking bar for .904" diameter lifter bores, for standard or tall lifter bore cylinder blocks  | .904"            | .815"               | 1.595"              |                        | 13574-16                  |
| Vertical locking bar for .904" diameter lifter bores, with .210" offset left and right intake pushrod seats, for standard or tall lifter bore cylinder blocks | .904"            | .815"               | 1.595"              |                        | 13575-16                  |

## Replacement Locking Bar Kits for Horizontal Bar Roller Lifters (All Kits Include Two Locking Bars and Four Hold Down Springs)

| Application                  | Part No. |
|------------------------------|----------|
| <b>Chevrolet V-8 262-400</b> |          |
| For Part Number: 11515-16    | 99557-1  |
| <b>Chevrolet V-8 396-502</b> |          |
| For Part Number: 13515-16    | 99559-1  |

VALVE TRAIN



## Assembly Lube (Paste)

Crane Super Moly Lube is a moly-disulfide base lubricant, for use on cam lobes, lifters and distributor drive gears and should be used for all cam installations (except for roller lifter applications). Advised for cup-end pushrod installation where only splash lubricant is utilized.

Also used in many areas of transmission and driveline assembly, where high initial loading occurs, and galling should be minimized. Not recommended where normal oil flow may be impeded due to the high viscosity of this product.

| Description                 | Part No. |
|-----------------------------|----------|
| <b>Two 1-ounce packages</b> | 99002-1  |
| <b>1-pound container</b>    | 99004-1  |



Crane Engine Assembly Lube is specially formulated to provide extra lubrication protection to engine components during assembly, and to provide outstanding resistance to scuffing, wear and friction during critical break-in. This lubricant is recommended for use on several different engine components, such as: rocker arm fulcrum balls, needle bearings, roller tips or rocker shafts; timing chain sprockets and gears; roller lifters and roller camshafts; engine bearing surfaces; outer surface of hydraulic or mechanical lifter bodies (use Super Moly Lube [paste] on face of these lifters).

| Description              | Part No. |
|--------------------------|----------|
| <b>4-ounce container</b> | 99008-1  |



## Super Lube Break-In Concentrate For Cam & Lifter Installation

The original Crane Cams Super Lube Break-In Concentrate is an anti-wear additive formulated with a high concentration of special zinc dithiophosphate to provide sustained protection against cam lobe and flat-faced lifter scuffing and wear. This is especially important when using modern oils that have been compounded for use with roller-type camshafts. This oil supplement is to be added to the engine oil for the initial break-in period after the installation of a new camshaft and lifters.

| Description              | Part No. |
|--------------------------|----------|
| <b>8-ounce container</b> | 99003-1  |



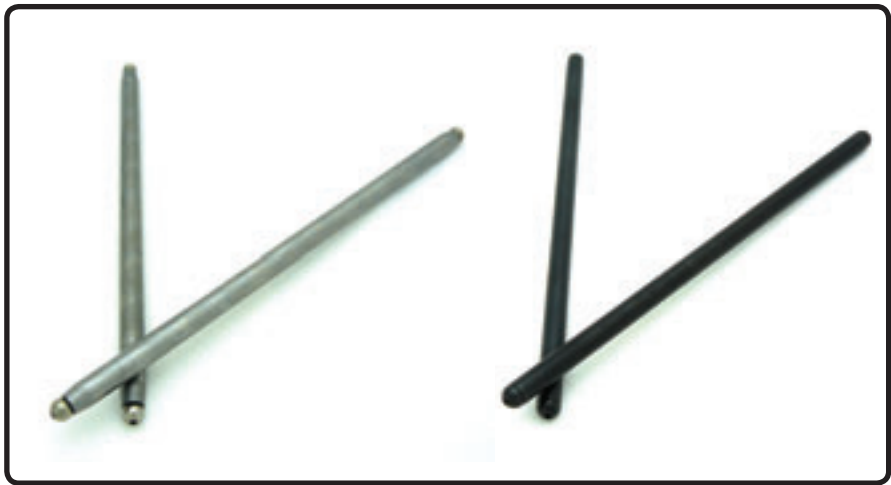
# Pushrods

## The Strongest, Most Reliable Chromemoly Steel Pushrods Available!

Crane Cams precision manufactures high strength tubular steel pushrods for almost any engine. Popular length and diameter pushrods are listed here.

**Custom made pushrods** are also available by using our "Special Order Pushrod" Form, page 305. These pushrods are available in any length, diameter of tubing, type of ends, with or without heat treating.

Crane performance pushrods are made from 4130 chromemoly seamless steel tubing. The ends are precision made, carburized, heat treated for strength and wear resistance and press fit into the tubing. Where indicated, Crane pushrods are also carbonitride heat treated to strengthen the tubing and harden it for use with or without pushrod guideplates. In these instances, the ends are spot welded into the tubing for maximum strength and reliability. **Hardened pushrods must be used with steel pushrod guideplate equipped cylinder heads** (page 311) **to prevent premature wear and failure.**



Also listed in this section, where applicable, are the **Crane Pro-Series One-Piece Pushrods**. These are cold-forged, die formed, heat treated and centerless ground pushrods for both small and big block Chevrolet V-8 engines and other engine applications where pushrods with 5/16" dia. ball ends are required. For additional information, see page 309.

| Application  | Length | Overall Length | Tubing Dia. | Ends |        | Part No.  |
|--|--------|----------------|-------------|------|--------|-----------|
|  |        |                |             | Top  | Bottom |           |
| <b>American Motors V-8 (Includes AMC/Jeep)</b>   |        |                |             |      |        |           |
| 70-91, 304 thru 401 with hydraulic lifters, Pro Series One Piece, heat treated, heavy wall                                   | Stock  | 7.850          | 5/16        |      |        | 95637-16  |
| 66-91, 290 thru 401 with mechanical lifters, Pro Series One Piece, heat treated, heavy wall                                  | Stock  | 8.050          | 5/16        |      |        | 95641-16  |
| 66-91, 290 thru 401 with 66550-16 roller lifters, Pro Series One Piece, heat treated, heavy wall                             | +.200  | 8.250          | 5/16        |      |        | 95645-16  |
| <b>Cadillac V-8</b>  |        |                |             |      |        |           |
| 68-81, 368 thru 500 heat treated, heavy wall   | Stock  | 10.200         | 5/16        | B-4  | B-4    | 102621-16 |
| <b>Chevrolet I-6</b>   |        |                |             |      |        |           |
| 62-84, 194-230-250 heat treated, heavy wall  | Stock  | 9.718          | 5/16        | B-4  | B-4    | 20621-12  |
| 62-84, 194-230-250 with Crane aluminum rocker arms, heat treated, heavy wall   | +.282  | 10.000         | 5/16        | B-4  | B-4    | 20622-12  |
| <b>Chevrolet V-6</b>   |        |                |             |      |        |           |
| 80-88, 60° 173 with cast iron in-line valve cylinder heads, heat treated, heavy wall   | Stock  | 6.163          | 5/16        | B-4  | B-4    | 25621-12  |
| 78-86, 90° 200 thru 262 heat treated, heavy wall   | Stock  | 7.765          | 5/16        | B-4  | B-4    | 11621-12  |
| 92-02, 90° 4.3L with Factory Hydraulic Roller Lifters, heat treated, heavy wall  | Stock  | 7.178          | 5/16        | B-4  | B-4    | 10621-12  |
| <b>Chevrolet Small Block V-8</b>   |        |                |             |      |        |           |
| 55-87, 262 thru 400 with Crane Hydraulic Roller Lifters, heat treated, heavy wall  | -.719  | 7.046          | 5/16        | B-4  | B-4    | 11628-16  |
| 55-87, 262 thru 400 heat treated   | Stock  | 7.765          | 5/16        | B-4  | B-4    | 11621-16  |
| 55-87, 262 thru 400 heat treated, heavy wall   | Stock  | 7.765          | 5/16        | B-4  | B-4    | 11630-16  |
| 55-87, 262 thru 400 heat treated   | +.100  | 7.865          | 5/16        | B-4  | B-4    | 11622-16  |
| 55-87, 262 thru 400 heat treated, heavy wall   | +.100  | 7.865          | 5/16        | B-4  | B-4    | 11632-16  |
| 55-87, 262 thru 400 heat treated   | +.160  | 7.925          | 5/16        | B-4  | B-4    | 11624-16  |
| 55-87, 262 thru 400 heat treated, heavy wall   | +.200  | 7.965          | 5/16        | B-4  | B-4    | 11633-16  |
| 55-87, 262 thru 400 heat treated, heavy wall   | +.250  | 8.015          | 5/16        | B-4  | B-4    | 11635-16  |
| 88-99, 305-350 with Factory Hydraulic Roller Lifters, heat treated, heavy wall   | Stock  | 7.178          | 5/16        | B-4  | B-4    | 10621-16  |
| 97-10, LS1-LS2-LS6 5.7L Pro Series One Piece, heat treated, heavy wall (.080)  | Stock  | 7.400          | 5/16        |      |        | 144621-16 |
| 97-10, LS1-LS2-LS6 5.7L Pro Series One Piece, heat treated, heavy wall (.080) for Crane Adjustable Rocker Arm Conversion Kit | -.150  | 7.250          | 5/16        |      |        | 144622-16 |

| Application   | Length           | Overall Length             | Tubing Dia.  | Ends               |                    | Part No.        |
|---|------------------|----------------------------|--------------|--------------------|--------------------|-----------------|
|   |                  |                            |              | Top                | Bottom             |                 |
| <b>Chevrolet V-8</b>  |                  |                            |              |                    |                    |                 |
| 58-65, 348-409-427 (Z-11) <i>with Crane Hydraulic Roller Lifters</i> , heat treated, heavy wall   | -.0686<br>-.0692 | 8.100 Int.<br>8.450 Exh.   | 5/16<br>5/16 | B-4<br>B-4         | B-4<br>B-4         | <b>15630-16</b> |
| 58-65, 348-409-427 (Z-11) <i>with Crane Hydraulic Roller Lifters</i> , heat treated, heavy wall   | -.0686<br>-.0692 | 8.100 Int.<br>8.450 Exh.   | 3/8<br>3/8   | B-2 w/h<br>B-2 w/h | B-2 w/h<br>B-2 w/h | <b>15640-16</b> |
| 58-65, 348-409-427 (Z-11), heat treated, heavy wall   | Stock<br>Stock   | 8.786 Int.<br>9.142 Exh.   | 5/16<br>5/16 | B-4<br>B-4         | B-4<br>B-4         | <b>15621-16</b> |
| 58-65, 348-409-427 (Z-11), heat treated, heavy wall   | Stock<br>Stock   | 8.786 Int.<br>9.142 Exh.   | 3/8<br>3/8   | B-2 w/h<br>B-2 w/h | B-2 w/h<br>B-2 w/h | <b>15634-16</b> |
| <b>Chevrolet Big Block V-8</b>  |                  |                            |              |                    |                    |                 |
| 65-90, 396 thru 454 <i>with Crane Hydraulic Roller Lifters</i> , heat treated, heavy wall   | -.719<br>-.719   | 7.531 Int.<br>8.531 Exh.   | 3/8<br>3/8   | B-2 w/h<br>B-2 w/h | B-2 w/h<br>B-2 w/h | <b>13628-16</b> |
| 65-90, 396 thru 454 <i>with Crane Hydraulic Roller Lifters</i> , Pro Series One Piece, heat treated, heavy wall   | -.700<br>-.700   | 7.566 Int.<br>8.550 Exh.   | 3/8<br>3/8   |                    |                    | <b>13642-16</b> |
| 65-90, 396 thru 454 heat treated, heavy wall  | Stock<br>Stock   | 8.250 Int.<br>9.250 Exh.   | 3/8<br>3/8   | B-2 w/h<br>B-2 w/h | B-2 w/h<br>B-2 w/h | <b>13634-16</b> |
| 65-90, 396 thru 454 Pro Series One Piece, heat treated, heavy wall  | Stock<br>Stock   | 8.250 Int.<br>9.250 Exh.   | 3/8<br>3/8   |                    |                    | <b>13640-16</b> |
| 65-90, 396 thru 454 heat treated, heavy wall  | Stock<br>Stock   | 8.250 Int.<br>9.250 Exh.   | 7/16<br>7/16 | B-14<br>B-14       | B-14<br>B-14       | <b>13630-16</b> |
| 66-90, 366-427 Tall Deck (+.400") <i>w/ Crane Hyd. Roller Lifters</i> , heat treated, heavy wall  | -.719<br>-.719   | 7.936 Int.<br>8.906 Exh.   | 3/8<br>3/8   | B-2 w/h<br>B-2 w/h | B-2 w/h<br>B-2 w/h | <b>13629-16</b> |
| 66-90, 366-427 Tall Deck (+.400") <i>w/ Crane Hyd. Roller Lifters</i> , Pro Series One Piece, heat treated, heavy wall  | -.705<br>-.675   | 7.950 Int.<br>8.950 Exh.   | 3/8<br>3/8   |                    |                    | <b>13643-16</b> |
| 66-90, 366-427 Tall Deck (+.400") heat treated, heavy wall  | Stock<br>Stock   | 8.655 Int.<br>9.625 Exh.   | 3/8<br>3/8   | B-2 w/h<br>B-2 w/h | B-2 w/h<br>B-2 w/h | <b>13635-16</b> |
| 01-08, 8.1 Litre with hydraulic lifters and adjustable rockers, Pro Series One Piece, heat treated, heavy wall  | Stock<br>Stock   | 8.200 Int.<br>9.150 Exh.   | 3/8<br>3/8   |                    |                    | <b>26640-16</b> |
| <b>Chrysler-Dodge-Plymouth V-8</b>  |                  |                            |              |                    |                    |                 |
| 64-91, 273 thru 360 "LA" with hydraulic lifters and adjustable rockers, heat treated, heavy wall  | Stock            | 7.330                      | 5/16         | C-4                | B-3                | <b>69621-16</b> |
| 64-91, 273 thru 360 "LA", <i>with Crane Hydraulic Roller Lifters</i> and adjustable rockers, heat treated, heavy wall   | -.750            | 6.580                      | 5/16         | C-4                | B-3                | <b>69628-16</b> |
| 64-91, 273 thru 360 "LA", with mechanical lifters and adjustable rockers, heat treated, heavy wall  | Stock            | 7.455                      | 5/16         | C-4                | B-3                | <b>69622-16</b> |
| 92-00, 318-360 "Magnum" <i>with Factory Hydraulic Roller Lifters</i> and Crane adjustable rockers with <b>36655-16</b> conversion kit, heat treated, heavy wall | Stock            | 6.812                      | 5/16         | B-4                | B-4                | <b>36621-16</b> |
| 58-78, 350 thru 400 "B" <b>Low Block</b> with hydraulic lifters and adjustable rockers, heat treated, heavy wall  | Stock            | 8.250                      | 3/8          | C-2                | B-2                | <b>64640-16</b> |
| 58-78, 350 thru 400 "B" <b>Low Block with Crane Hydraulic Roller Lifters</b> and adjustable rockers, heat treated, heavy wall                                   | -.750            | 7.500                      | 3/8          | C-2                | B-2                | <b>64628-16</b> |
| 58-78, 350 thru 400 "B" <b>Low Block</b> with mechanical lifters and adjustable rockers, heat treated, heavy wall   | Stock            | 8.609                      | 3/8          | C-2                | B-1                | <b>64621-16</b> |
| 58-78, 413 thru 440 "B" <b>High Block</b> with hydraulic lifters and adjustable rockers, heat treated, heavy wall   | Stock            | 9.125                      | 3/8          | C-2                | B-2                | <b>64641-16</b> |
| 58-78, 413 thru 440 "B" <b>High Block with Crane Hydraulic Roller Lifters</b> and adjustable rockers, heat treated, heavy wall                                  | -.750            | 8.375                      | 3/8          | C-2                | B-2                | <b>64629-16</b> |
| 58-78, 413 thru 440 "B" <b>High Block</b> with mechanical lifters and adjustable rockers, heat treated, heavy wall  | Stock            | 9.250                      | 3/8          | C-2                | B-1                | <b>64622-16</b> |
| 64-71, 426 Hemi with hydraulic lifters, heat treated, heavy wall  | Stock<br>Stock   | 10.656 Int.<br>11.594 Exh. | 3/8<br>3/8   | C-2<br>C-2         | B-1<br>B-1         | <b>66621-16</b> |
| 64-71, 426 Hemi <i>with Crane Hydraulic Roller Lifters</i> , heat treated, heavy wall   | -.750<br>-.750   | 9.906 Int.<br>10.843 Exh.  | 3/8<br>3/8   | C-2<br>C-2         | B-2<br>B-2         | <b>66628-16</b> |
| 64-71, 426 Hemi with mechanical lifters heat treated, heavy wall  | Stock<br>Stock   | 10.843 Int.<br>11.781 Exh. | 3/8<br>3/8   | C-2<br>C-2         | B-1<br>B-1         | <b>65689-16</b> |

Section Continued

# Pushrods

| Application  | Length | Overall Length | Tubing Dia. | Ends    |         | Part No. |
|--|--------|----------------|-------------|---------|---------|----------|
|  |        |                |             | Top     | Bottom  |          |
| <b>Ford I-6</b>  |        |                |             |         |         |          |
| 64-96, 240-300, heat treated, heavy wall   | Stock  | 10.203         | 5/16        | B-4     | B-4     | 50621-12 |
| <b>Ford V-8</b>  |        |                |             |         |         |          |
| 63-68, 221 thru 302, heat treated, heavy wall  | Stock  | 6.812          | 5/16        | B-4     | B-4     | 36621-16 |
| 69-95, 255 thru 302, heat treated, heavy wall  | Stock  | 6.875          | 5/16        | B-4     | B-4     | 36622-16 |
| 68-87, 255 thru 302 with <b>Crane Retrofit Hydraulic Roller Lifters</b> and bottleneck studs or pedestal mount rocker arms, Pro Series One Piece, heat treated, heavy wall         | -.332  | 6.500          | 5/16        |         |         | 95610-16 |
| 77-87, 255 thru 302 with <b>Crane Retrofit Hydraulic Roller Lifters</b> and adjustable rocker arms, Pro Series One Piece, heat treated, heavy wall                                 | -.132  | 6.700          | 5/16        |         |         | 95614-16 |
| 86-96, 302 and 302 H.O. with <b>Factory Hydraulic Roller Lifters</b> , standard base circle camshaft, and pedestal mount rocker arms, heat treated, heavy wall                     | Stock  | 6.258          | 5/16        | B-4     | B-4     | 36631-16 |
| 86-96, 302 and 302 H.O. with <b>Factory Hydraulic Roller Lifters</b> and Crane aluminum rocker arms, heat treated, heavy wall  | +.117  | 6.375          | 5/16        | B-4     | B-4     | 36625-16 |
| 85-94, 302 and 302 H.O. with <b>Factory Hydraulic Roller Lifters</b> and Crane Fireball cylinder heads, Pro Series One Piece, heat treated, heavy wall                             | -.095  | 6.200          | 5/16        |         |         | 95604-16 |
| 69-93, 351W, Pro Series One Piece, heat treated, heavy wall  | Stock  | 8.200          | 5/16        |         |         | 95644-16 |
| 69-93, 351W with <b>Crane Retrofit Hydraulic Roller Lifters</b> and bottleneck studs or pedestal mount rocker arms, Pro Series One Piece, heat treated, heavy wall                 | -.366  | 7.800          | 5/16        |         |         | 95636-16 |
| 77-93, 351W with <b>Crane Retrofit Hydraulic Roller Lifters</b> and adjustable rocker arms, Pro Series One Piece, heat treated, heavy wall   | -.191  | 8.000          | 5/16        |         |         | 95640-16 |
| 69-70, Boss 302, Pro Series One Piece, heat treated, heavy wall  | Stock  | 7.650          | 5/16        |         |         | 95633-16 |
| 70-74, 351C, heat treated, heavy wall  | Stock  | 8.406          | 5/16        | B-4     | B-4     | 52621-16 |
| 70-74, 351C with <b>Crane Retrofit Hydraulic Roller Lifters</b> and adjustable rocker arms, heat treated, Pro Series One Piece, heat treated, heavy wall                           | -.625  | 7.781          | 5/16        |         |         | 95636-16 |
| 71-72, Boss 351, Pro Series One Piece, heat treated, heavy wall  | Stock  | 8.500          | 5/16        |         |         | 95650-16 |
| 71-82, 351M-400 w/ <b>Crane Retrofit Hydraulic Roller Lifters</b> & pedestal mount rocker arms, Pro Series One Piece, heat treated, heavy wall                                     | -.800  | 8.700          | 5/16        |         |         | 95654-16 |
| 71-82, 351M-400 with <b>Crane Retrofit Hydraulic Roller Lifters</b> and adjustable rocker arms with <b>52655-16</b> conversion kit, Pro Series One Piece, heat treated, heavy wall | -.625  | 8.900          | 5/16        |         |         | 95658-16 |
| 58-76, 332 thru 428 FE with hydraulic and mechanical lifters and adjustable rockers, heat treated, heavy wall  | Stock  | 9.234          | 3/8         | C-1     | B-1     | 34621-16 |
| 58-76, 332 thru 428 FE with shell mechanical lifters and adjustable rockers, heat treated, heavy wall  | Stock  | 10.656         | 3/8         | C-1     | B-1     | 34622-16 |
| 58-76, 332 thru 428 with roller lifters, heat treated, heavy wall  | -.109  | 9.125          | 3/8         | C-1     | B-2     | 34641-16 |
| 69-97, 370 thru 460, heat treated, heavy wall  | Stock  | 8.563          | 5/16        | B-2 w/h | B-2 w/h | 35622-16 |
| 70, 429 Super CJ, and all 370 thru 460 with 5/16" pushrod guideplates, heat treated, heavy wall  | Stock  | 8.656          | 5/16        | B-4     | B-4     | 35621-16 |
| <b>MG-MGA-MGB 4 Cylinder</b>   |        |                |             |         |         |          |
| 40-54, 1250cc TC, TD, TF   | Stock  | 8.531          | 5/16        | C-3     | B-11    | 905-0003 |
| 57-80, 1598-1798cc MGA, MGB  | Stock  | 10.656         | 5/16        | C-3     | B-11    | 905-0004 |
| <b>Oldsmobile V-8</b>  |        |                |             |         |         |          |
| 64-84, 260-307-330-350-403 with hydraulic lifters, Pro Series One Piece, heat treated, heavy wall  | Stock  | 8.350          | 5/16        |         |         | 95647-16 |
| <b>Pontiac V-8</b>   |        |                |             |         |         |          |
| 57-81, 265-287-316-347-350-389-400-428-455, heat treated, heavy wall   | Stock  | 9.125          | 5/16        | B-4     | B-4     | 28624-16 |
| 62-67, 326-389-400-421, Pro Series One Piece, heat treated, heavy wall   | Stock  | 8.700          | 5/16        |         |         | 95654-16 |

## Pro Series, One-Piece, Cold-Forged Pushrods

Crane Cams Pro Series, one-piece pushrods are **cold-forged**, with a precisely formed end that is **actually stronger** than the tubing wall itself!

Pro Series pushrods are made from aircraft quality, .080" wall, 4130 chromemoly steel tubing. Finished overall length is accurate to within  $\pm .005"$  per pushrod. These are available in 5/16" and 3/8" diameter, each with 5/16" diameter ball ends, and .050" length increments (6.000" to 9.200" OAL in 5/16" diameter, and 7.050" to 11.000" OAL in 3/8" diameter), heat treated for use with or without pushrod guide-plates. Each pushrod is laser etched with its overall length for quick identification.



### Pro Series 5/16" Diameter One-Piece Pushrods

| Overall Length | Part No. | Overall Length | Part No. | Overall Length | Part No. | Overall Length | Part No. |
|----------------|----------|----------------|----------|----------------|----------|----------------|----------|
| 6.000"         | 95600-16 | 6.850"         | 95617-16 | 7.650"         | 95633-16 | 8.450"         | 95649-16 |
| 6.050"         | 95601-16 | 6.900"         | 95618-16 | 7.700"         | 95634-16 | 8.500"         | 95650-16 |
| 6.100"         | 95602-16 | 6.950"         | 95619-16 | 7.750"         | 95635-16 | 8.550"         | 95651-16 |
| 6.150"         | 95603-16 | 7.000"         | 95620-16 | 7.800"         | 95636-16 | 8.600"         | 95652-16 |
| 6.200"         | 95604-16 | 7.050"         | 95621-16 | 7.850"         | 95637-16 | 8.650"         | 95653-16 |
| 6.250"         | 95605-16 | 7.100"         | 95622-16 | 7.900"         | 95638-16 | 8.700"         | 95654-16 |
| 6.300"         | 95606-16 | 7.150"         | 95623-16 | 7.950"         | 95639-16 | 8.750"         | 95655-16 |
| 6.350"         | 95607-16 | 7.200"         | 95624-16 | 8.000"         | 95640-16 | 8.800"         | 95656-16 |
| 6.400"         | 95608-16 | 7.250"         | 95625-16 | 8.050"         | 95641-16 | 8.850"         | 95657-16 |
| 6.450"         | 95609-16 | 7.300"         | 95626-16 | 8.100"         | 95642-16 | 8.900"         | 95658-16 |
| 6.500"         | 95610-16 | 7.350"         | 95627-16 | 8.150"         | 95643-16 | 8.950"         | 95659-16 |
| 6.550"         | 95611-16 | 7.400"         | 95628-16 | 8.200"         | 95644-16 | 9.000"         | 95660-16 |
| 6.600"         | 95612-16 | 7.450"         | 95629-16 | 8.250"         | 95645-16 | 9.050"         | 95661-16 |
| 6.650"         | 95613-16 | 7.500"         | 95630-16 | 8.300"         | 95646-16 | 9.100"         | 95662-16 |
| 6.700"         | 95614-16 | 7.550"         | 95631-16 | 8.350"         | 95647-16 | 9.150"         | 95663-16 |
| 6.750"         | 95615-16 | 7.600"         | 95632-16 | 8.400"         | 95648-16 | 9.200"         | 95664-16 |
| 6.800"         | 95616-16 |                |          |                |          |                |          |

### Pro Series 3/8" Diameter One-Piece Pushrods

| Overall Length | Part No. | Overall Length | Part No. | Overall Length | Part No. | Overall Length | Part No. |
|----------------|----------|----------------|----------|----------------|----------|----------------|----------|
| 7.050"         | 95777-16 | 8.050"         | 95797-16 | 9.050"         | 95817-16 | 10.050"        | 95837-16 |
| 7.100"         | 95778-16 | 8.100"         | 95798-16 | 9.100"         | 95818-16 | 10.100"        | 95838-16 |
| 7.150"         | 95779-16 | 8.150"         | 95799-16 | 9.150"         | 95819-16 | 10.150"        | 95839-16 |
| 7.200"         | 95780-16 | 8.200"         | 95800-16 | 9.200"         | 95820-16 | 10.200"        | 95840-16 |
| 7.250"         | 95781-16 | 8.250"         | 95801-16 | 9.250"         | 95821-16 | 10.250"        | 95841-16 |
| 7.300"         | 95782-16 | 8.300"         | 95802-16 | 9.300"         | 95822-16 | 10.300"        | 95842-16 |
| 7.350"         | 95783-16 | 8.350"         | 95803-16 | 9.350"         | 95823-16 | 10.350"        | 95843-16 |
| 7.400"         | 95784-16 | 8.400"         | 95804-16 | 9.400"         | 95824-16 | 10.400"        | 95844-16 |
| 7.450"         | 95785-16 | 8.450"         | 95805-16 | 9.450"         | 95825-16 | 10.450"        | 95845-16 |
| 7.500"         | 95786-16 | 8.500"         | 95806-16 | 9.500"         | 95826-16 | 10.500"        | 95846-16 |
| 7.550"         | 95787-16 | 8.550"         | 95807-16 | 9.550"         | 95827-16 | 10.550"        | 95847-16 |
| 7.600"         | 95788-16 | 8.600"         | 95808-16 | 9.600"         | 95828-16 | 10.600"        | 95848-16 |
| 7.650"         | 95789-16 | 8.650"         | 95809-16 | 9.650"         | 95829-16 | 10.650"        | 95849-16 |
| 7.700"         | 95790-16 | 8.700"         | 95810-16 | 9.700"         | 95830-16 | 10.700"        | 95850-16 |
| 7.750"         | 95791-16 | 8.750"         | 95811-16 | 9.750"         | 95831-16 | 10.750"        | 95851-16 |
| 7.800"         | 95792-16 | 8.800"         | 95812-16 | 9.800"         | 95832-16 | 10.800"        | 95852-16 |
| 7.850"         | 95793-16 | 8.850"         | 95813-16 | 9.850"         | 95833-16 | 10.850"        | 95853-16 |
| 7.900"         | 95794-16 | 8.900"         | 95814-16 | 9.900"         | 95834-16 | 10.900"        | 95854-16 |
| 7.950"         | 95795-16 | 8.950"         | 95815-16 | 9.950"         | 95835-16 | 10.950"        | 95855-16 |
| 8.000"         | 95796-16 | 9.000"         | 95816-16 | 10.000"        | 95836-16 | 11.000"        | 95856-16 |

# Pushrods - Accessories

## Adjustable Checking Pushrods

These Checking Pushrods are adjustable with over 1.000" of travel, enabling you to arrive at the correct pushrod length to create the correct valve train geometry for your particular engine, or when using hydraulic lifters, to determine hydraulic lifter preload. These pushrods **are not to be run in your engine**. Once correct pushrod length is determined, refer to our pushrod listings on pages 306-308, or order special length pushrods on page 305. Checking Pushrods come two per package.



| Application  | Length                             | Diameter       | Part No. |
|--|------------------------------------|----------------|----------|
| <b>American Motors V-8 290 thru 401</b>              | 7.500 to 8.700"                    | 5/16"          | 99726-2  |
| <b>Buick V-8 400 thru 455</b>                        | 8.500 to 9.800"                    | 5/16"          | 99727-2  |
| <b>Chevrolet V-8 262 thru 400</b>                    | 7.500 to 8.700"                    | 5/16"          | 99726-2  |
| <b>Chevrolet V-8 396 thru 454</b>                    | 7.500 to 8.700"<br>8.500 to 9.800" | 5/16"<br>5/16" | 99730-2  |
| <b>Chrysler "LA" V-8 273 thru 360</b>                | 6.125 to 7.500"                    | 5/16"          | 99725-2  |
| <b>Chrysler "B" V-8 Low Block 350, 361, 383, 400</b> | 7.500 to 8.700"                    | 5/16"          | 99726-2  |
| <b>Chrysler "B" V-8 High Block 413, 426, 440</b>     | 8.500 to 9.800"                    | 5/16"          | 99727-2  |
| <b>Ford V-8 221 thru 302</b>                         | 6.125 to 7.500"                    | 5/16"          | 99725-2  |
| <b>Ford V-8 Boss 302</b>                             | 6.125 to 7.500"                    | 5/16"          | 99725-2  |
| <b>Ford V-8 351M-400</b>                             | 8.500 to 9.800"                    | 5/16"          | 99727-2  |
| <b>Ford V-8 Boss 351, 351C, 370-429-460</b>          | 7.500 to 8.700"                    | 5/16"          | 99726-2  |
| <b>Oldsmobile V-8 260 thru 350 and 403</b>           | 7.500 to 8.700"                    | 5/16"          | 99726-2  |
| <b>Oldsmobile V-8 400, 425, 455</b>                  | 8.500 to 9.800"                    | 5/16"          | 99727-2  |
| <b>Pontiac V-8 326, 389, 400, 421</b>                | 8.500 to 9.800"                    | 5/16"          | 99727-2  |

Section Continued



## Pushrod Guideplates

Crane's pushrod guideplates feature a significant increase in strength over stock designs. Their unique design provides a more rigid guide, reduces flexing, stabilizes the pushrod and reduces rocker arm "wander." All sets include 8 guideplates.

**Heat treated and carburized pushrods *must be used* with these guideplates, or *pre-mature pushrod wear and failure will occur.*** Cylinder head machining and screw-in rocker arm studs may be required to install these guideplates. Refer to the engine application and rocker arm pages for additional information.



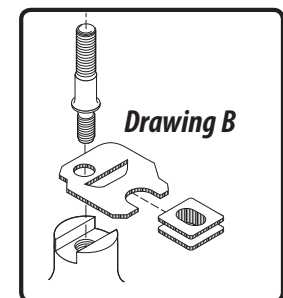
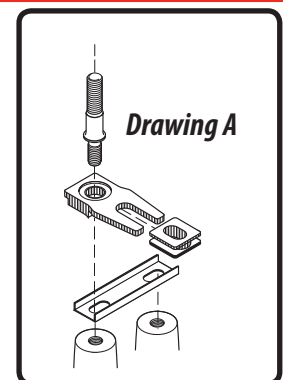
| Application  | Pushrod Diameter | Part No. |
|--|------------------|----------|
| <b>Chevrolet 90° V-6 78-86, 200 thru 262</b>   | 5/16"            | 11650-1  |
| <b>Chevrolet V-8 55-95, 262 thru 400</b>   | 5/16"            | 11650-1  |
| <b>Chevrolet V-8 97-10, LS1-LS2-LS6 5.7L Vortec 4800, 5300, 6000<br/>(for use with Crane adjustable rocker arms)</b> | 5/16"            | 144650-1 |
|  | 3/8"             | 144651-1 |
| <b>Chevrolet V-8 08-10, L92 cylinder heads<br/>(for use with Crane adjustable rocker arms)</b>                       | 5/16"            | 201650-1 |
|  | 3/8"             | 201651-1 |
| <b>Chevrolet V-8 65-90, 396 thru 454 and 502</b>   | 3/8"             | 13650-1  |
| <b>Ford V-8 62-92, 221 thru 302 and 351W</b>   | 5/16"            | 36650-1  |
| <b>Ford V-8 69-82, 351C-351M-400</b>   | 5/16"            | 52650-1  |

## Rocker Arm Guideplate Conversion Kits

### Converts Pedestal-Mount Dodge and Ford Cylinder Heads to Adjustable Rocker Arms

Crane Cams' rocker arm stud/pushrod guideplate conversion kits enable you to convert late-model Dodge and Ford V-8 engines with pedestal mount rocker arms to an adjustable-type valve train **without machine work or cylinder head removal.** Detailed description on page 325.

| Description   | Part No.                       |
|---|--------------------------------|
| Dodge 92-02, Magnum V-8 318 (5.2L) and 360 (5.9L) engines with 5/16"-18 threaded stud bosses. Must use <b>11746-16</b> or <b>11759-16</b> aluminum rocker arms for 3/8" rocker arm studs and 5/16" dia. <b>36621-16</b> (heat treated) pushrods.  | <b>36655-16</b><br>(Drawing A) |
| Dodge 92-02, Magnum V-8 318 (5.2L) and 360 (5.9L) engines with 5/16"-18 threaded stud bosses. Must use <b>11747-16</b> or <b>11755-16</b> aluminum rocker arms for 7/16" rocker arm studs and 5/16" dia. <b>36621-16</b> (heat treated) pushrods. | <b>36656-16</b><br>(Drawing A) |
| Dodge Aluminum Magnum and Crate Motor cylinder heads with 3/8"-16 threaded stud bosses. Must use <b>11746-16</b> or <b>11759-16</b> aluminum rocker arms for 3/8" rocker arm studs and 5/16" dia. <b>36621-16</b> (heat treated) pushrods.        | <b>70655-16</b><br>(Drawing A) |
| Ford V-8 77-00, 255-302, 302 H.O., 351W engines. Will accept 3/8" stud die-formed steel or Crane aluminum rocker arms and 5/16" diameter pushrods.  | <b>36655-16</b><br>(Drawing A) |
| Ford V-8 77-00, 255-302, 302 H.O., 351W engines. Will accept 7/16" stud Crane aluminum rocker arms and 5/16" diameter pushrods.   | <b>36656-16</b><br>(Drawing A) |
| Ford V-8 70-82, 351C, 351M, 400, and Ford V-8 72-97, 370-429-460 engines. Will accept 7/16" stud die-formed steel or Crane aluminum rocker arms and 5/16" dia. pushrods.  | <b>52655-16</b><br>(Drawing B) |
| Ford V-8 72-97, 370, 429, 460 Engines. Will accept 7/16" stud die-formed steel or Crane aluminum rocker arms and 3/8" diameter pushrods.  | <b>35655-16</b><br>(Drawing B) |
| Replacement guideplate insert for 5/16" diameter pushrods (included in kits)  | <b>52655GB-16</b>              |
| Replacement guideplate insert for 3/8" diameter pushrods (included in kits)   | <b>35655GB-16</b>              |



# Rocker Arms, Steel & Ductile Iron

## Die-Formed Steel

Stock design with better material and heat treat. Many supplied with long slot or extra long slot to provide more travel for increased valve lift. Economically priced for budget engine rebuild.



## Ductile Iron Shaft Mounted

Creates adjustable valve train for Chrysler "LA" and "B", and Ford "FE" series engines. Ductile iron is stronger than stock cast iron material. Allows valve lash or lifter preload to be accurately set. Can correct for valve stems that vary in length. Requires new pushrods with cup on one end to fit adjusting screw.



| Application  | Ratio     | Stud Dia. | Part No.                                   |
|--|-----------|-----------|--|
| <b>Chevrolet 90° V-6 78-87, 200 thru 262</b><br><b>Chevrolet V-8 55-87, 262 thru 400 (Not for use with valve springs over 1.520" O.D.)</b>   |           |           | <b>Die-Formed Steel, Non Self-Aligning</b> |
| Stock ratio, factory performance replacement with long slot  | 1.50      | 3/8"      | <b>11800-16</b>                            |
| Stock ratio, with extra long slot  | 1.50      | 3/8"      | <b>11801-16</b>                            |
| Increased ratio, with extra long slot  | 1.60      | 3/8"      | <b>11802-16</b>                            |
| Eight each of 1.50 and 1.60 ratio, with extra long slot, includes Kool Nuts  | 1.50/1.60 | 3/8"      | <b>11803-16</b>                            |
| <b>Chevrolet V-8 65-90, 396 thru 454 &amp; 502 (Not for use with valve springs over 1.560" O.D.)</b>   |           |           | <b>Die-Formed Steel</b>                    |
| Stock ratio, performance replacement, long slot for up to .560" valve lift   | 1.70      | 7/16"     | <b>13800-16<sup>a</sup></b>                |
| Stock ratio, with extra long slot  | 1.70      | 7/16"     | <b>13801-16<sup>a</sup></b>                |
| <b>Chrysler-Dodge-Plymouth V-8 64-91, "LA" 273-318-340-360</b>   |           |           | <b>Ductile Iron Construction</b>           |
| Stock ratio, adjustable shaft mount design for standard cylinder heads, (will NOT fit Trans-Am, W-2 or W-5 heads), must use special pushrods. See page 307 for details. New shafts available separately ( <b>69618-2</b> ).  | 1.50      | Shaft     | <b>69770-16</b>                            |
| Increased ratio, adjustable shaft mount design for standard cylinder heads (will NOT fit Trans-Am, W-2 or W-5 heads), must use special pushrods. See page 307 for details. New shafts available separately ( <b>69618-2</b> ).   | 1.60      | Shaft     | <b>69771-16<sup>a</sup></b>                |
| <b>Chrysler-Dodge-Plymouth V-8 58-78, "B" 350-361-383-400-413-426-440</b>  |           |           | <b>Ductile Iron Construction</b>           |
| Stock ratio, adjustable shaft mount design for standard cylinder heads, (will NOT fit Stage IV or Stage V heads), must use special pushrods. See page 307 for details. When ordering spares, specify Left Adjuster Offset ( <b>64770L-1</b> ) or Right Adjuster Offset ( <b>64770R-1</b> ) New shafts available separately ( <b>64618-2</b> ).     | 1.50      | Shaft     | <b>64770-16</b>                            |
| Increased ratio, adjustable shaft mount design for standard cylinder heads, (Will NOT fit Stage IV or Stage V heads), must use special pushrods. See page 307 for details. When ordering spares, specify Left Adjuster Offset ( <b>64771L-1</b> ) or Right Adjuster Offset ( <b>64771R-1</b> ) New shafts available separately ( <b>64618-2</b> ). | 1.60      | Shaft     | <b>64771-16<sup>a</sup></b>                |
| <b>Ford V-8 62-00, 221-260-289-302 and 351W</b>  |           |           | <b>Cast Construction</b>                   |
| Stock ratio, non-rail type with standard stud diameter   | 1.60      | 3/8"      | <b>36800-16</b>                            |
| Stock ratio, rail type (self aligning), with standard stud diameter, supplied with both 5/16"-24 and 3/8"-24 nuts.   | 1.60      | 3/8"      | <b>36801-16</b>                            |

**TECH TIP:** Ford cylinder heads with pedestal mount type rocker arms can be easily converted to use adjustable style rocker arms by using a Crane Stud Conversion Kit with Guideplates. See page 325 for details.

|  |      |            |   |
|--|------|------------|---|
| <b>Ford V-8 69-82, Boss 302, Boss 351, 351C-351M-400</b>   |      |            | <b>Die-Formed Steel, Pedestal Mount</b> |
| Stock ratio, for 70-82 cylinder heads, non-adjustable, secured with 5/16" bolt. For hydraulic lifter and hydraulic roller cam applications only. | 1.71 | 5/16" Bolt | <b>52800-16</b>                         |

**TECH TIP:** Ford cylinder heads with pedestal mount type rocker arms can be easily converted to use adjustable style rocker arms by using a Crane Stud Rocker Arm Stud Conversion Kit. See page 325 for details.

|  |      |       |                                  |
|--|------|-------|----------------------------------|
| <b>Ford V-8 63-76, "FE" 352-360-390-406-410-427-428</b>  |      |       | <b>Ductile Iron Construction</b> |
| Adjustable shaft mount design, stock ratio, must use special pushrods. See page 308 for details. New shafts available separately ( <b>34618-2</b> ). | 1.76 | Shaft | <b>34772-16</b>                  |

|  |      |            |   |
|--|------|------------|---|
| <b>Ford V-8 68-97, 370-429-460</b>   |      |            | <b>Die-Formed Steel, Pedestal Mount</b> |
| Stock ratio, for 72-97 cylinder heads, non-adjustable, secured with 5/16" bolt. For hydraulic lifter and hydraulic roller cam applications only. | 1.71 | 5/16" Bolt | <b>52800-16<sup>b</sup></b>             |

**TECH TIP:** Ford cylinder heads with pedestal mount type rocker arms can be easily converted to use adjustable style rocker arms by using a Crane Stud Rocker Arm Stud Conversion Kit. See page 325 for details.

Section Continued

| Application   | Ratio                   | Stud Dia. | Part No. |
|---|-------------------------|-----------|----------|
| <b>Oldsmobile V-8 67-84, 260-307-350-400-403-425-455</b>  | <b>Die-Formed Steel</b> |           |          |
| Stock ratio, rocker arms supplied with individual fulcrums, bridge straps, and secured with bolt.                 | 1.61                    | Bridge    | 80800-16 |
| <b>Pontiac V-8 67-81, 265-287-301-316-326-347-350-370-389-400-421-428-455</b>                                     | <b>Die-Formed Steel</b> |           |          |
| Stock ratio, for use with bottleneck studs with 7/16" bottom and 3/8" top, includes spacer washers and 3/8" nuts. | 1.50                    | 7/16" BN  | 28800-16 |

## Nitro-Carb Steel Rockers

### For Race Use where Rules Require Stock Type Rockers

Crane Cams Nitro-Carb™ rockers offer 3 to 5 times greater resistance to wear, fatigue and fracture in high-stress areas. Available exclusively from Crane Cams, Nitro-Carb rockers eliminate pushrod cup and fulcrum failures with wear resistance and surface hardness properties that are similar to ceramics.

Nitro-Carb rockers deliver the most accurate ratios of any similar steel rockers. Nitro-Carb rockers are precision die-formed from heat treated steel. Most feature a long-slot design, and come complete with oil-groove pivot balls and adjusting nuts at no extra charge.

Crane Cams Nitro-Carb rockers are perfect for high valve spring pressure. Testing in-lab and on-track, (using Crane **99846-16**, XHTCS Tool Steel, stock diameter, 1.255" o.d. valve springs, 115 lb. seat, 350 lbs. open pressure) showed Crane Nitro-Carb rockers to be failure-free after enduring millions of running cycles.

Nitro-Carb rockers should be used anywhere rules require "stock type steel rockers". This includes NHRA Stock and IHRA Pure Stock Class drag racing applications plus oval track categories where stock-type rockers are required.



- 3 To 5 Times Stronger Than Stock-Type Steel Rockers
- Precision Die-Formed Steel
- Most Ratio-Accurate Available
- Small & Big-Block Chevy Applications

| Application                                  | Part No.                |
|--|-------------------------|
| <b>Chevrolet 90° V-6 78-87, 200 thru 262</b> |                         |
| 1.5 ratio, extra long slot, 3/8" stud        | 11801C-1 <sup>c,d</sup> |
| 1.6 ratio, extra long slot, 3/8" stud        | 11802C-1 <sup>c,d</sup> |
| <b>Chevrolet V-8 55-87, 262 thru 400</b>     |                         |
| 1.5 ratio, extra long slot, 3/8" stud        | 11801C-16 <sup>c</sup>  |
| 1.6 ratio, extra long slot, 3/8" stud        | 11802C-16 <sup>c</sup>  |
| <b>Chevrolet V-8 88-99, 305 thru 350</b>     |                         |
| 1.5 ratio, self aligning, 3/8" stud          | 10800C-16 <sup>e</sup>  |
| <b>Chevrolet V-8 65-90, 396 thru 454</b>     |                         |
| 1.7 ratio, long slot, 7/16" stud             | 13801C-16 <sup>f</sup>  |

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

- |   |  |
|---|--|
| <p><b>a</b> 1991-00 454-502 Gen V and VI hydraulic cam engines require the installation of <b>99152-16</b> 7/16" rocker arm studs and factory pushrod guideplates (no machining required). Mechanical camshaft equipped engines require the installation of <b>99157-16</b> 7/16" rocker arm studs and <b>13650-1</b> pushrod guideplates (machining required).</p> <p><b>b</b> On 68-71 engines equipped with bottleneck studs, using <b>99768-16</b> positive locking nuts will permit valve adjustment. The 72-97 engines equipped with pedestal mount rocker arms can use our <b>36655-16</b> Conversion Kit for 3/8" pushrods (no machining required) for street applications.</p> | <p><b>c</b> Non-self aligning, must be used with pushrod guideplate cylinder heads.</p> <p><b>d</b> Order in quantity of 12.</p> <p><b>e</b> For self-aligning applications only. Not for use with pushrod guideplates, or with cylinder head castings that guide the pushrod, as severe pushrod wear will occur. Not for LS1 series engines.</p> <p><b>f</b> 1992-00 Gen V and VI 454-502 engines require the installation of <b>99152-16</b> 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.</p> |
|---|--|

## Crane Cams Aluminum Rocker Arms More Horsepower, Torque And Response In An Easy Bolt-On!

Crane Cams first introduced the racing world to aluminum rockers in 1964, and since then we've manufactured and sold more than seven million Crane aluminum rockers! From the beginning, our famous **Gold-Race™** aluminum rockers have been continually enhanced with design and engineering improvements as well as materials upgrades. Now many generations later, today's **Crane Classic**, **Energizer®**, **Gold-Race™**, **Pro Series** stud-mount, **Gold-Race™** shaft-mount or all-new **Quick-Lift™** rockers are absolutely the strongest, most ratio-accurate, most durable aluminum rockers made!

Crane aluminum rockers are preferred by professional racing engine builders and offer outstanding power and performance advantages for street applications. An easy "Saturday afternoon" installation project, bolting on a set of Crane aluminum rockers can add from 15 up to 30+ horsepower (with increased ratios), plus increase throttle response in a street performance engine. Crane aluminum rockers are so strong, durable and reliable that Ford Motor Company® selected our Crane Energizer® needle-bearing fulcrum, full-roller rockers for their Cobra V-8 production line engines. To further demonstrate their reliability, they carried the full Ford factory warranty coverage!

Crane Cams offers aluminum rocker arms for nearly all American V-8 and V-6 engines plus many inline four and six-cylinder applications. Stock, plus optional longer-than-stock ratios, are offered for most engines. Some applications also provide offset push-rod seats for use on aftermarket cylinder heads with non-stock port locations. All Crane Cams aluminum rockers come complete with a set of our own positive locking adjusting nuts, or adjusting screws, at no extra cost to you.



### The Strongest, Lightest, Most Ratio-Accurate Aluminum Rockers



**"GOOD"**



**"BETTER"**



**"BEST"**

Stud Mounted, Full-Roller Fulcrum, Roller Tip

**Energizer®**

**Crane Classic**

**Gold-Race™**

|  |   |   |   |
|--|---|---|---|
| <b>Main Body Material</b>              | <ul style="list-style-type: none"> <li>• Aerospace Quality,</li> <li>• Vacuum Die-Formed Casting Process</li> </ul>   | <ul style="list-style-type: none"> <li>• Extruded Billet</li> <li>• Original Profile</li> <li>• Heat Treated</li> </ul>   | <ul style="list-style-type: none"> <li>• Extruded Billet</li> <li>• Heat Treated</li> </ul>   |
| <b>Manufacturing Method</b>            | <ul style="list-style-type: none"> <li>• CNC Machined</li> </ul>  | <ul style="list-style-type: none"> <li>• CNC Machined</li> </ul>  | <ul style="list-style-type: none"> <li>• CNC Machined</li> </ul>  |
| <b>Maximum Open Spring Pressure</b>    | <ul style="list-style-type: none"> <li>• 450 lbs.</li> </ul>  | <ul style="list-style-type: none"> <li>• 600 lbs.</li> </ul>  | <ul style="list-style-type: none"> <li>• 700 lbs. Std.</li> <li>• 900 lbs. Wide-Body</li> </ul>   |
| <b>Fulcrum Design, Unique Features</b> | <ul style="list-style-type: none"> <li>• Precision Ground Steel Needle Bearings</li> <li>• Heat Treated Steel Roller Tips</li> <li>• Adjustable Lock Nuts Included</li> </ul>   | <ul style="list-style-type: none"> <li>• Precision Ground Steel Needle Bearings</li> <li>• Heat Treated Steel Roller Tips</li> <li>• Adjustable Lock Nuts Included</li> </ul> | <ul style="list-style-type: none"> <li>• Precision Ground Steel Needle Bearings</li> <li>• Heat Treated Steel Roller Tips</li> <li>• Adjustable Lock Nuts Included</li> </ul>                             |
| <b>Ideal Uses</b>                      | <ul style="list-style-type: none"> <li>• Hydraulic &amp; Hydraulic Roller Lifter Equipped Engines</li> <li>• Street Performance</li> <li>• Bracket Drag Racing</li> <li>• Moderate Circle Track</li> <li>• Truck Performance</li> </ul> | <ul style="list-style-type: none"> <li>• Street Performance</li> <li>• Marine</li> <li>• Bracket Drag Racing</li> <li>• Moderate Circle Track</li> <li>• Off Road</li> </ul>  | <ul style="list-style-type: none"> <li>• Serious Street</li> <li>• Bracket Drag Racing</li> <li>• Circle Track Race</li> <li>• Truck Performance/Race</li> <li>• Marine Race or Pleasure Craft</li> </ul> |
| <b>Engine Applications</b>             | <ul style="list-style-type: none"> <li>• Popular V-8 Engines</li> </ul>   | <ul style="list-style-type: none"> <li>• Popular V-8 Engines</li> </ul>   | <ul style="list-style-type: none"> <li>• Most V-8, 6 Cylinder Inline, V-6 &amp; 4 Cylinder Engines</li> </ul>   |

# Aluminum Rocker Arms, Energizer



## Energizer Rocker Arms

### Die Formed Aluminum Body with Needle Bearing Fulcrum and Roller Tip

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



| Application  | Ratio | Stud Dia.  | Part No.              |
|--|-------|------------|-----------------------|
| <b>American Motors V-8 66-91, 290 thru 401</b>   |       |            |                       |
| Stock ratio and standard stud diameter   | 1.60  | 3/8"       | 11746-16 <sup>a</sup> |
| Stock ratio with enlarged stud diameter  | 1.60  | 7/16"      | 11747-16 <sup>b</sup> |
| <b>Chevrolet 90° V-6 78-87, 200 thru 262</b>   |       |            |                       |
| Stock ratio and standard stud diameter   | 1.50  | 3/8"       | 11744-12 <sup>c</sup> |
| Stock ratio with enlarged stud diameter  | 1.50  | 7/16"      | 11745-12 <sup>c</sup> |
| Increased ratio with standard stud diameter  | 1.60  | 3/8"       | 11746-12 <sup>c</sup> |
| Increased ratio with enlarged stud diameter  | 1.60  | 7/16"      | 11747-12 <sup>c</sup> |
| <b>Chevrolet V-8 55-87, 262 thru 400</b>   |       |            |                       |
| Stock ratio and standard stud diameter   | 1.50  | 3/8"       | 11744-16 <sup>c</sup> |
| Stock ratio with enlarged stud diameter  | 1.50  | 7/16"      | 11745-16 <sup>c</sup> |
| Increased ratio with standard stud diameter  | 1.60  | 3/8"       | 11746-16 <sup>c</sup> |
| Increased ratio with enlarged stud diameter  | 1.60  | 7/16"      | 11747-16 <sup>c</sup> |
| <b>Chevrolet V-8 65-90, 396-402-427-454-502, also 91-00 454-502 Gen V and VI and 01-08 8.1 Litre</b>   |       |            |                       |
| Stock ratio and standard stud diameter   | 1.70  | 7/16"      | 13744-16 <sup>d</sup> |
| <b>Chrysler-Dodge-Plymouth 92-00, "Magnum" 318 (5.2L), 360 (5.9L) (except Magnum R/T)</b>  |       |            |                       |
| Stock ratio, must use Crane's stud conversion kit with guideplates (36655-16), and pushrods (36668-16), to convert from the stock pedestal rocker arm to this adjustable stud mount design. (Optional heat treated pushrods available, part no. 36621-16.) Stock valve covers must be modified or spaced upward approximately 3/8" to avoid interference | 1.60  | 3/8"       | 11746-16              |
| <b>Ford V-8 62-00, 221-255-260-289-302-351W</b>  |       |            |                       |
| Stock ratio and standard stud diameter   | 1.60  | 3/8"       | 11746-16 <sup>e</sup> |
| Stock ratio with enlarged stud diameter  | 1.60  | 7/16"      | 11747-16 <sup>f</sup> |
| <b>Ford V-8 77-00, 255-302, 5.0L H.O. and 351W</b>   |       |            |                       |
| Increased ratio, pedestal mount type for 77-00 cylinder heads, non-adjustable, secured with 5/16" bolt. For hydraulic lifter, and hydraulic roller cam applications only.  | 1.70  | 5/16" Bolt | 44746-16 <sup>g</sup> |
| <b>Ford V-8 69-82, Boss 302, Boss 351, 351C-351M-400</b>   |       |            |                       |
| Stock ratio and standard Boss stud diameter  | 1.72  | 7/16"      | 27744-16 <sup>h</sup> |
| <b>Ford V-8 68-97, 370-429-460</b>   |       |            |                       |
| Stock ratio and standard Cobra Jet stud diameter   | 1.72  | 7/16"      | 27744-16 <sup>i</sup> |
| <b>Oldsmobile V-8 67-91, 260-307-350-400-403-425-455 cu.in.</b>  |       |            |                       |
| Increased ratio for 3/8" straight studs  | 1.65  | 3/8"       | 80744-16 <sup>j</sup> |
| <b>Pontiac V-8 67-81, 265 thru 455 with Straight 7/16" Rocker Arm Studs</b>  |       |            |                       |
| Increased ratio with enlarged stud diameter.   | 1.65  | 7/16"      | 28747-16 <sup>k</sup> |

- a Must machine 74-91 cylinder heads and install 99156-16 3/8" rocker arm studs and aftermarket pushrod guideplates. Special order heat treated pushrods are required for use with guideplates.
- b Must machine 66-91 cylinder heads and install 99157-16 7/16" rocker arm studs and aftermarket pushrod guideplates. Special order heat treated pushrods are required for use with guideplates.
- c The 1988-99 engines equipped with self-aligning rocker arms require the installation of pushrod guideplates (and 99157-16 7/16" rocker arm studs, if applicable) and appropriate heat treated pushrods in order for these rocker arms to function properly. Valve cover clearance must also be checked. Not suitable for use with center-bolt valve covers.
- d The 1991-2000 Gen V & VI engines require the installation of 99152-16 7/16" rocker arm studs (no machining required) & factory pushrod guideplates. For applications w/ over 480 pounds open valve spring pressure, the cylinder heads must be machined for the installation of 99157-16 7/16" rocker arm studs & 13650-1 pushrod guideplates. The 2001-2008 8.1L engines require the installation of 99155-16 7/16" rocker arm studs (no machining required) & factory pushrod guideplates.
- e Must machine 66-00 cylinder heads and install 99156-16 3/8" rocker arm studs and 36650-1 pushrod guideplates (heat treated pushrods required), or use 36655-16 Conversion Kit (no machining required) on 77-00 pedestal mount cylinder heads for street applications.
- f Must machine 66-00 cylinder heads and install 99157-16 7/16" rocker arm studs and 36650-1 pushrod guideplates (heat treated pushrods required).

- g Includes Rocker Arm Pedestal Shim Kit 99170-1.
- h The 351C-351M-400 engines equipped with pedestal mount rocker arms require the use of 52655-16 Conversion Kit (no machining required) for street applications.
- i On 68-71 engines equipped with bottleneck studs, install 99159-16 straight 7/16" studs to permit valve adjustment. The 72-97 engines equipped with pedestal mount rocker arms can use our 35655-16 Conversion Kit for 3/8" pushrods (no machining required) for street applications.
- j Must machine cylinder heads and install 99156-16 3/8" rocker arm studs and aftermarket pushrod guideplates (special length heat treated pushrods required).
- k On engines not equipped with 7/16" rocker arm studs, cylinder head machining is required for the installation of 99157-16 7/16" rocker arm studs.

**NOTE:**

Energizer rocker arms are recommended for hydraulic lifter and hydraulic roller camshaft equipped engines only. Energizer rocker arms with 11 and 44 prefix part numbers will accept a maximum valve spring dia. of 1.500" and maximum spring pressure of 500 lbs. Energizer rockers with 13, 28, and 80 prefix part numbers will accept a maximum valve spring diameter of 1.550" and 500 lbs. maximum spring pressure.

# Aluminum Rocker Arms, Crane Classic

## Crane Classic Rocker Arms

### Extruded Aluminum Body with Needle Bearing Fulcrum and Roller Tip

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



| Application  | Ratio | Stud Dia.  | Part No.              |
|--|-------|------------|-----------------------|
| <b>American Motors V-8 66-91, 290 thru 401</b>   |       |            |                       |
| Stock ratio and standard stud diameter   | 1.60  | 3/8"       | 36774-16 <sup>a</sup> |
| Stock ratio with enlarged stud diameter  | 1.60  | 7/16"      | 36775-16 <sup>b</sup> |
| <b>Chevrolet 90° V-6 78-87, 200 thru 262</b>   |       |            |                       |
| Stock ratio and standard stud diameter   | 1.50  | 3/8"       | 11774-12 <sup>c</sup> |
| Stock ratio with enlarged stud diameter  | 1.50  | 7/16"      | 11775-12 <sup>c</sup> |
| Increased ratio with standard stud diameter  | 1.60  | 3/8"       | 11776-12 <sup>c</sup> |
| Increased ratio with enlarged stud diameter  | 1.60  | 7/16"      | 11777-12 <sup>c</sup> |
| <b>Chevrolet V-8 55-87, 262 thru 400</b>   |       |            |                       |
| Stock ratio and standard stud diameter   | 1.50  | 3/8"       | 11774-16 <sup>c</sup> |
| Stock ratio with enlarged stud diameter  | 1.50  | 7/16"      | 11775-16 <sup>c</sup> |
| Increased ratio with standard stud diameter  | 1.60  | 3/8"       | 11776-16 <sup>c</sup> |
| Increased ratio with enlarged stud diameter  | 1.60  | 7/16"      | 11777-16 <sup>c</sup> |
| <b>Chevrolet V-8 65-90, 396-402-427-454-502, also 91-00 454-502 Gen V and VI and 01-08 8.1 Litre</b>   |       |            |                       |
| Stock ratio and standard stud diameter   | 1.70  | 7/16"      | 13774-16 <sup>d</sup> |
| <b>Chrysler-Dodge-Plymouth 92-00, "Magnum" 318 (5.2L), 360 (5.9L) (except Magnum R/T)</b>  |       |            |                       |
| Stock ratio, must use Crane's stud conversion kit with guideplates (36655-16), and pushrods (36668-16), to convert from the stock pedestal rocker arm to this adjustable stud mount design. (Optional heat treated pushrods available, part no. 36621-16.) Stock valve covers must be modified or spaced upward approximately 3/8" to avoid interference | 1.60  | 3/8"       | 11776-16              |
| <b>Ford V-8 62-00, 221-255-260-289-302-351W</b>  |       |            |                       |
| Stock ratio and standard stud diameter   | 1.60  | 3/8"       | 36774-16 <sup>e</sup> |
| Stock ratio with enlarged stud diameter  | 1.60  | 7/16"      | 36775-16 <sup>f</sup> |
| <b>Ford V-8 77-00, 255-302, 5.0L H.O. and 351W</b>   |       |            |                       |
| Stock ratio, pedestal mount type for 77-00 cylinder heads, non-adjustable, secured with 5/16" bolt. For hydraulic lifter, and hydraulic roller cam applications only.  | 1.60  | 5/16" Bolt | 44774-16 <sup>g</sup> |
| <b>Ford V-8 69-82, Boss 302, Boss 351, 351C-351M-400</b>   |       |            |                       |
| Stock ratio and standard Boss stud diameter  | 1.72  | 7/16"      | 27774-16 <sup>h</sup> |
| <b>Ford V-8 68-97, 370-429-460</b>   |       |            |                       |
| Stock ratio and standard Cobra Jet stud diameter   | 1.72  | 7/16"      | 27774-16 <sup>i</sup> |
| <b>Oldsmobile V-8 67-91, 260-307-350-400-403-425-455 cu.in.</b>  |       |            |                       |
| Increased ratio for 7/16" studs  | 1.65  | 7/16"      | 28774-16 <sup>j</sup> |
| <b>Pontiac V-8 67-81, 265 thru 455 with Straight 7/16" Rocker Arm Studs</b>  |       |            |                       |
| Increased ratio with enlarged stud diameter.   | 1.65  | 7/16"      | 28774-16 <sup>k</sup> |

VALVE TRAIN

- a Must machine 74-91 cylinder heads and install 99156-16 3/8" rocker arm studs and aftermarket pushrod guideplates. Special order heat treated pushrods are required for use with guideplates.
  - b Must machine 66-91 cylinder heads and install 99157-16 7/16" rocker arm studs and aftermarket pushrod guideplates. Special order heat treated pushrods are required for use with guideplates.
  - c The 1988-99 engines equipped with self-aligning rocker arms require the installation of pushrod guideplates (and 99157-16 7/16" rocker arm studs, if applicable) and appropriate heat treated pushrods in order for these rocker arms to function properly. Valve cover clearance must also be checked. Not suitable for use with center-bolt valve covers.
  - d The 1991-2000 Gen V and VI engines require the installation of 99152-16 7/16" rocker arm studs (no machining required) and factory pushrod guideplates. For applications with over 480 pounds open valve spring pressure, the cylinder heads must be machined for the installation of 99157-16 7/16" rocker arm studs and 13650-1 pushrod guideplates. The 2001-2008 8.1L engines require the installation of 99155-16 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
  - e Must machine 66-00 cylinder heads and install 99156-16 3/8" rocker arm studs and 36650-1 pushrod guideplates (heat treated pushrods required), or use 36655-16 Conversion Kit (no machining required) on 77-00 pedestal mount cylinder heads for street applications.
  - f Must machine 66-00 cylinder heads and install 99157-16 7/16" rocker arm studs and 36650-1 pushrod guideplates (heat treated pushrods required).
  - g Includes Rocker Arm Pedestal Shim Kit 99170-1.
  - h The 351C-351M-400 engines equipped with pedestal mount rocker arms require the use of 52655-16 Conversion Kit (no machining required) for street applications.
  - i On 68-71 engines equipped with bottleneck studs, install 99159-16 straight 7/16" studs to permit valve adjustment. The 72-97 engines equipped with pedestal mount rocker arms can use our 35655-16 Conversion Kit for 3/8" pushrods (no machining required) for street applications.
  - j Must machine cylinder heads and install 99157-16 7/16" rocker arm studs and aftermarket pushrod guideplates (special length heat treated pushrods required).
  - k On engines not equipped with 7/16" rocker arm studs, cylinder head machining is required for the installation of 99157-16 7/16" rocker arm studs.
- NOTE:**  
Crane Classic Rocker arms are intended for use in applications where open valve spring pressures do not exceed 600 pounds.

# Aluminum Roller Rockers, Gold Race Extruded - Stud Mount



## Gold Race Extruded Rocker Arms

Crane Cams' needle-bearing fulcrum, roller-tip, extruded aluminum rocker arms have been racing's most popular aluminum rockers since their introduction in 1964.

Now, over seven million rockers later, the nation's leading racers and engine builders know they can trust the strength, ratio accuracy, quality, and reliability of Crane's famous gold anodized, aluminum rockers.

Custom ratios, offsets, and stud sizes available. Contact Crane's Performance Consultants for details.



| Application  | Ratio   | Stud Dia. | Part No.   |
|--|---------|-----------|--|
| <b>American Motors V-8 66-91, 290-304-343-360 (5.9L)-390-401 cu.in.</b>  |         |           |  |
| Stock ratio and standard stud diameter   | 1.60    | 3/8"      | 36750-16 <sup>a</sup>  |
| Stock ratio with enlarged stud diameter  | 1.60    | 7/16"     | 86757-16 <sup>b</sup>  |
| Increased ratio with enlarged stud diameter  | 1.70    | 7/16"     | 36757-16 <sup>b</sup>  |
| <b>Chevrolet I-6 62-84, 194-230-250-292 cu.in.</b>   |         |           |  |
| Stock ratio and standard stud diameter   | 1.70    | 3/8"      | 20750-12 <sup>c</sup>  |
| Stock ratio with enlarged stud diameter  | 1.70    | 7/16"     | 13750-12 <sup>c</sup>  |
| <b>Chevrolet 60° V-6 80-94, 173 (2.8L) and 189 (3.1L) cu.in.</b>   |         |           |  |
| Stock ratio with special stud diameter   | 1.50    | 3/8"      | 25750-12 <sup>d</sup>  |
| Increased ratio with special stud diameter   | 1.60    | 3/8"      | 25759-12 <sup>d</sup>  |
| <b>Chevrolet 90° V-6 78-86, 200-229 (3.8L) and 262 (4.3L) and Chevrolet V-8 55-87, 262-267-283-302-305 (5.0L)-307-327-350 (5.0L)-400 cu.in.</b>            |         |           |  |
|  |         |           | <b>Non-Self Aligning Rocker Arms</b>   |
| Stock ratio and standard stud diameter   | 1.50    | 3/8"      | 11750-16   |
| Stock ratio with enlarged stud diameter, clears 1.630" O.D. springs  | 1.50    | 7/16"     | 11752-16   |
| Stock ratio with enlarged stud diameter, clears 1.630" O.D. springs, new "Wide Body" design for severe usage applications                                  | 1.50    | 7/16"     | 11771-16   |
| Increased ratio and standard stud diameter   | 1.60    | 3/8"      | 11759-16   |
| Increased ratio with enlarged stud diameter, clears 1.630" O.D. springs  | 1.60    | 7/16"     | 11755-16   |
| Increased ratio with enlarged stud diameter, clears 1.630" O.D. springs, new "Wide Body" design for severe usage applications                              | 1.60    | 7/16"     | 11772-16   |
| Eight each of 1.5 (11750) and 1.6 (11759) ratio, with standard stud diameter   | 1.5/1.6 | 3/8"      | 11748-16   |
| Increased ratio and standard stud diameter   | 1.7     | 3/8"      | 70759-16 <sup>e</sup>  |
| <b>NOTE: The following rocker arms have offset pushrod seat locations and require modification of the pushrod guideplates. Rockers sold individually.</b>  |         |           |  |
| .150" Left Offset, stock ratio with enlarged stud diameter, clears 1.630" O.D. springs   | 1.50    | 7/16"     | 11765L-1   |
| .150" Right Offset, stock ratio with enlarged stud diameter, clears 1.630" O.D. springs  | 1.50    | 7/16"     | 11765R-1   |
| .150" Left Offset, increased ratio with enlarged stud diameter, clears 1.630" O.D. springs   | 1.60    | 7/16"     | 11766L-1   |
| .150" Right Offset, increased ratio with enlarged stud diameter, clears 1.630" O.D. springs  | 1.60    | 7/16"     | 11766R-1   |
| .225" Left Offset, increased ratio with enlarged stud diameter, clears 1.630" O.D. springs   | 1.60    | 7/16"     | 11762L-1   |
| .225" Right Offset, increased ratio with enlarged stud diameter, clears 1.630" O.D. springs  | 1.60    | 7/16"     | 11762R-1   |
| <b>Chevrolet 90° V-6 87-91, 262 (4.3L) and Chevrolet V-8 88-99, 305 (5.0L)-350 (5.7L) cu.in.</b>   |         |           |  |
|  |         |           | <b>Non-Self Aligning, Narrow Body Rocker Arms For Center Bolt Valve Covers</b> |
| Stock ratio and standard stud diameter   | 1.50    | 3/8"      | 10750-16 <sup>e</sup>  |
| Increased ratio and standard stud diameter   | 1.60    | 3/8"      | 10759-16 <sup>e</sup>  |
|  |         |           | <b>Self Aligning, Narrow Body Rocker Arms For Center Bolt Valve Covers</b>     |
| Stock ratio and standard stud diameter (cannot be used with a mechanical lifter cam)   | 1.50    | 3/8"      | 10751-16 <sup>f</sup>  |
| Increased ratio and standard stud diameter (cannot be used with a mechanical lifter cam)   | 1.60    | 3/8"      | 10758-16 <sup>f</sup>  |
| Increased ratio and standard stud diameter with limited lift travel (.550" maximum) and certified ratio for crate motor rules applications. (Non-anodized) | 1.60    | 3/8"      | 10756-16 <sup>f</sup>  |

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

Section Continued

- a Must machine 74-91 cylinder heads and install 99156-16 3/8" rocker arm studs and aftermarket pushrod guideplates. Special order heat treated pushrods are required for use with guideplates.
- b Must machine 66-91 cylinder heads and install 99157-16 7/16" rocker arm studs and aftermarket pushrod guideplates. Special order heat treated pushrods are required for use with guideplates.
- c Requires 20622-12 pushrods for 194-230-250 engines.
- d For inline valve cylinder heads. Set includes special 10mm x 1.50 bottom x 3/8" x 24 top rocker arm studs (99148-12), no machining required. Check valve covers and intake manifold for clearance throughout the lift cycle.
- e The 1988-99 engines equipped with self-aligning rocker arms require the installation of pushrod guideplates (and 99156-16 rocker arm studs, if applicable) and appropriate heat treated pushrods in order for these rocker arms to function properly. Valve cover clearance must also be checked in late model applications.
- f For use in self-aligning applications. Do not use with pushrod guideplates or with cylinder head castings that guide the pushrods, as severe pushrod wear will occur. Not for use in LS1 type engines.

# Aluminum Roller Rockers, Gold Race Extruded - Stud Mount

## Gold Race Extruded Rocker Arms

| Application  | Ratio | Stud Dia. | Part No.                |
|--|-------|-----------|-------------------------|
| <b>Chevrolet V-8, 97-10, LS1-LS2-LS6 5.7L and Vortec 4800, 5300, 6000</b>  |       |           |                         |
| Bolt-down, non-adjustable, stock ratio (Non-anodized)  | 1.70  | 8mm       | 144760-16               |
| Bolt-down, non-adjustable, increased ratio (Non-anodized)  | 1.80  | 8mm       | 144761-16               |
| Adjustable, stock ratio and standard stud diameter   | 1.70  | 3/8"      | 144750A-16 <sup>a</sup> |
| Adjustable, stock ratio and standard stud diameter (Complete installation kit including studs, guideplates and pushrods)   | 1.70  | 3/8"      | 144750-16 <sup>a</sup>  |
| Adjustable, stock ratio & standard stud diameter (Complete installation kit incl. studs, guideplates, & pushrods for Air Flow Research cylinder heads)   | 1.70  | 3/8"      | 144750AF-16             |
| Adjustable, increased ratio and standard stud diameter   | 1.80  | 3/8"      | 144759A-16 <sup>a</sup> |
| Adjustable, increased ratio and standard stud diameter (Complete installation kit including studs, guideplates and pushrods)   | 1.80  | 3/8"      | 144759-16 <sup>a</sup>  |
| Adjustable, increased ratio and standard stud diameter (Complete installation kit including studs, guideplates, and pushrods for Air Flow Research cylinder heads)   | 1.70  | 3/8"      | 144759AF-16             |
| <b>NOTE: We offer an optional pushrod guideplate set to install 3/8" diameter pushrods in these engines, part number 144651-1</b>  |       |           |                         |
| <b>Chevrolet V-8, LS-series with L92/LS3 Cylinder heads</b>  |       |           |                         |
| Bolt-down, non-adjustable, stock ratio (Non-anodized)  | 1.70  | 8mm       | 201760-16               |
| Bolt-down, non-adjustable, increased ratio (Non-anodized)  | 1.80  | 8mm       | 201761-16               |
| Adjustable, stock ratio and standard stud diameter (Complete installation kit including studs, guideplates, and pushrods)  | 1.70  | 3/8"      | 201750-16               |
| Adjustable, increased ratio and standard stud diameter (Complete installation kit including studs, guideplates, and pushrods)  | 1.80  | 3/8"      | 201759-16               |
| <b>NOTE: We offer an optional pushrod guideplate set to install 3/8" diameter pushrods in these engines, part number 201651-1</b>  |       |           |                         |
| <b>Chevrolet V-8, LS-series with LS7 Cylinder Heads</b>  |       |           |                         |
| Bolt-down, non-adjustable, stock ratio (Non-anodized)  | 1.80  | 8mm       | 203761-16               |
| <b>Chevrolet V-8 58-65, 348-409-427 (Z-11)</b>   |       |           |                         |
| Stock ratio and standard stud diameter   | 1.70  | 3/8"      | 15750-16                |
| Stock ratio and enlarged stud diameter   | 1.70  | 7/16"     | 13750-16                |
| <b>Chevrolet V-8 65-90, 396-402-427-454-502 also 91-00, 454-502 Gen V and VI and 01-08 8.1 Litre</b>   |       |           |                         |
| Reduced ratio and standard stud diameter   | 1.65  | 7/16"     | 13759-16 <sup>b</sup>   |
| Stock ratio and standard stud diameter   | 1.70  | 7/16"     | 13750-16 <sup>b</sup>   |
| Stock ratio and standard stud diameter, new "Wide Body" design for severe usage applications   | 1.70  | 7/16"     | 13763TR-16 <sup>b</sup> |
| Increased ratio and standard stud diameter   | 1.80  | 7/16"     | 13755-16 <sup>b</sup>   |
| <b>Chrysler-Dodge-Plymouth V-8 92-00, "Magnum" 318 (5.2L), 360 (5.9L) cu.in. (except Magnum R/T)</b>   |       |           |                         |
| Stock ratio, must use Crane's Rocker Arm Stud Conversion Kit, part no. 36655-16, and pushrods, part no. 36668-16, to convert from the stock pedestal rocker arm to this adjustable stud mount design. (Optional heat treated pushrods available, part no. 36621-16.) Stock valve covers must be modified, or spaced upward approximately 3/8" to avoid interference. | 1.60  | 3/8"      | 11759-16                |
| Increased ratio, must use Crane's Rocker Arm Stud Conversion Kit, 36655-16 and pushrods, 36668-16 to convert from the stock pedestal rocker arm to this adjustable stud mount design (Optional heat-treated pushrods available 36621-16) Stock valve covers must be modified, or spaced upward approximately 3/8" to avoid interference.                             | 1.70  | 3/8"      | 70759-16                |

VALVE TRAIN

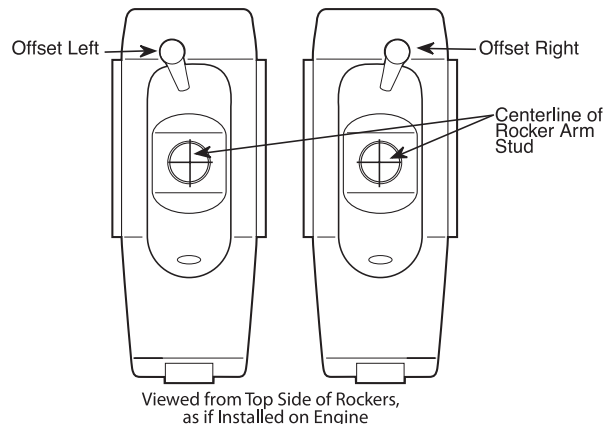


Narrow-body, self-aligning, extruded aluminum Gold Race rocker for late-model small-block Chevy, 88-99, 5.0-5.7L (except LS1 type applications), using center-bolt valve covers.



Extruded Gold Race rocker for Ford 289-302-351W-5.0L H.O., non-adjustable, 1.7 ratio. Uses stock-type 5/16" bolt. For hydraulic and hyd. roller cams only.

### IDENTIFYING CRANE GOLD RACE ROCKER PUSHROD SEAT OFFSETS





# Aluminum Roller Rockers, Gold Race Extruded - Stud Mount



## Gold Race Extruded Rocker Arms

| Application   | Ratio | Stud Dia.  | Part No.              |
|---|-------|------------|-----------------------|
| <b>Ford V-8 62-00, 221-260-289-302-351W cu.in. (And 5.0L H.O.)</b>  |       |            |                       |
| Stock ratio and standard stud diameter  | 1.60  | 3/8"       | 36750-16 <sup>d</sup> |
| Stock ratio pedestal mount type for 77-00 cylinder heads, non-adjustable, secured with 5/16" bolt. For hydraulic lifter and hydraulic roller cam applications only.   | 1.60  | 5/16" Bolt | 36759-16 <sup>e</sup> |
| Stock ratio with enlarged stud diameter   | 1.60  | 7/16"      | 86757-16 <sup>f</sup> |
| Increased ratio pedestal mount type for 77-00 cylinder heads, non-adjustable, secured w/ 5/16" bolt. For hydraulic lifter and hydraulic roller cam applications only. | 1.70  | 5/16" Bolt | 36758-16 <sup>e</sup> |
| Increased ratio with enlarged stud diameter   | 1.70  | 7/16"      | 36757-16 <sup>f</sup> |
| <b>Ford V-8 62-00, 221-260-289-302-351W and 302 SVO/302 Boss/351SVO blocks equipped with M-6049-N351 Sportsman cylinder heads</b>                                     |       |            |                       |
| Reduced ratio with enlarged diameter, .150" right offset intake   | 1.55  | 7/16"      | X14361-1              |
| Stock ratio with enlarged stud diameter, .150" right offset intake  | 1.60  | 7/16"      | X14351-1              |
| Increased ratio with enlarged stud diameter, .150" right offset intake  | 1.65  | 7/16"      | X14371-1              |
| Increased ratio with enlarged stud diameter, .150" right offset intake  | 1.70  | 7/16"      | X14411-1              |
| Reduced ratio with enlarged stud diameter, exhaust  | 1.55  | 7/16"      | X1444-1               |
| Stock ratio with enlarged stud diameter, exhaust  | 1.60  | 7/16"      | 86757-1               |
| <b>NOTE: (These rocker arms are listed and sold individually)</b>   |       |            |                       |
| <b>Ford V-8 351W and BOSS 351 Ford Racing blocks equipped with Dart Pro 1 cylinder heads</b>  |       |            |                       |
| Reduced ratio with enlarged diameter, and certified ratio for crate motor rules applications  | 1.50  | 7/16"      | 44755-16              |
| <b>Ford V-8 351W and BOSS 351 Ford Racing blocks equipped with Ford Racing Z304 cylinder heads</b>  |       |            |                       |
| Reduced ratio with enlarged diameter, .150" right offset intake, and certified ratio for crate motor rules applications   | 1.50  | 7/16"      | 44756-16              |
| <b>Ford V-8 69-82, 351C-351M-400, Boss 302 and 351 cu.in.</b>   |       |            |                       |
| Reduced ratio and standard Boss stud diameter   | 1.60  | 7/16"      | 86757-1               |
| Reduced ratio and standard Boss stud diameter   | 1.65  | 7/16"      | 27759-16 <sup>g</sup> |
| Stock ratio and standard Boss stud diameter   | 1.73  | 7/16"      | 27750-16 <sup>g</sup> |
| Stock ratio and standard Boss stud diameter, new "Wide Body" design for severe usage applications   | 1.73  | 7/16"      | 27771-16 <sup>g</sup> |
| <b>Ford V-8 68-97, 370-429-460 cu.in.</b>   |       |            |                       |
| Reduced ratio and standard Cobra Jet stud diameter  | 1.60  | 7/16"      | 27757-16 <sup>h</sup> |
| Reduced ratio and standard Cobra Jet stud diameter  | 1.65  | 7/16"      | 27759-16 <sup>h</sup> |
| Stock ratio and standard Cobra Jet stud diameter  | 1.73  | 7/16"      | 27750-16 <sup>h</sup> |
| Stock ratio and standard Cobra Jet stud diameter, new "Wide Body" design for severe usage applications  | 1.73  | 7/16"      | 27771-16 <sup>h</sup> |
| <b>Oldsmobile V-8 67-91, 260-307-350-400-403-425-455 cu.in.</b>   |       |            |                       |
| Stock ratio with enlarged stud diameter   | 1.60  | 7/16"      | 80757-16 <sup>i</sup> |
| Increased ratio, with enlarged stud diameter  | 1.70  | 7/16"      | 36757-16              |
| <b>Pontiac V-8 67-81, 265-287-301-316-326-347-350-389-400-421-428-455 cu.in.</b>  |       |            |                       |
| Stock ratio for use with Bottleneck studs with 7/16" bottom and 3/8" top threads  | 1.50  | 7/16" BN   | 28750-16              |
| Stock ratio for 7/16" straight studs  | 1.50  | 7/16"      | 28755-16 <sup>c</sup> |
| Increased ratio for 7/16" straight studs  | 1.65  | 7/16"      | 28758-16 <sup>c</sup> |

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

- a For use with standard valve covers. No machining or spacers required.
- b The 1991-2000 Gen V and VI engines require the installation of **99152-16** 7/16" rocker arm studs (no machining required) and factory pushrod guideplates. For applications with over 480 pounds open valve spring pressure, the cylinder heads must be machined for the installation of **99157-16** 7/16" rocker arm studs and **13650-1** pushrod guideplates. The 2001-2008 8.1L engines require the installation of **99155-16** 7/16" rocker arm studs (no machining required) and factory pushrod guideplates.
- c Must machine cylinder head and install **99157-16** 7/16" rocker arm studs.
- d Must machine 66-00 cylinder heads and install **99156-16** 3/8" rocker arm studs and **36650-1** pushrod guideplates (heat treated pushrods required), or use **36655-16** Conversion Kit (no machining required) on 77-00 pedestal mount cylinder heads for street applications.
- e Includes Rocker Arm Pedestal Shim Kit **99170-1**.
- f Must machine 66-00 cylinder heads and install **99157-16** 7/16" rocker arm studs and **36650-1** pushrod guideplates (heat treated pushrods required).
- g The 351C-351M-400 engines equipped with pedestal mount rocker arms require the use of our **52655-16** Conversion Kit (no machining required) for street applications.
- h On 68-71 engines equipped with bottleneck studs, install **99159-16** straight 7/16" studs to permit valve adjustment. The 72-97 engines equipped with pedestal mount rocker arms can use our **35655-16** Conversion Kit for 3/8" pushrods (no machining required) for street applications.
- i Must machine cylinder heads and install **99157-16** 7/16" rocker arm studs and aftermarket pushrod guideplates (special length heat treated pushrods required).

# Aluminum Gold Race, Shaft-Mount Rocker Arms

## Shaft Mount, Extruded Aluminum Rocker Arms

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.



| Application   | Ratio | Complete Set Part No. | Complete Set Contains  |                         |             |
|---|-------|-----------------------|------------------------|-------------------------|-------------|
|   |       |                       | Rocker Arms            | Shafts                  | Lube        |
| <b>Chrysler-Dodge-Plymouth V-8 64-91, "LA" 273-318-340-360 cu.in.</b>   |       |                       |                        |                         |             |
| Designed for standard cylinder heads (will not fit trans-am or W2/W5 heads)   | 1.50  | 69790-1               | 16 - 69750-1           | 1 - 69618-2             | 1 - 99008-1 |
| Designed for standard cylinder heads (will not fit trans-am or W2/W5 heads)   | 1.60  | 69791-1*              | 16 - 69751-1*          | 1 - 69618-2             | 1 - 99008-1 |
| Designed for W2 or W5 cylinder heads  |       | <b>Offset</b>         | <b>Intake Part No.</b> | <b>Exhaust Part No.</b> |             |
| <b>NOTE: These Shaft Rockers are purchased individually. A complete engine set requires: 4 Left Intakes, 4 Right Intakes, and 8 Exhausts. (Shafts and stands not supplied by Crane for W2 or W5.) Exhaust rockers are not offset.</b> | 1.50  | Left                  | 69765L-1               | 69760-1                 |             |
|   | 1.50  | Right                 | 69765R-1               | -----                   |             |
|   | 1.60  | Left                  | 69766L-1*              | 69761-1*                |             |
|   | 1.60  | Right                 | 69766R-1*              | -----                   |             |

| Application  | Ratio | Complete Set Part No. | Complete Set Contains                   |             |             |
|--|-------|-----------------------|---|-------------|-------------|
|  |       |                       | Rocker Arms                             | Shafts      | Lube        |
| <b>Chrysler-Dodge-Plymouth V-8 58-78, "B" 350-361-383-400-413-426-440 cu.in.</b>   |       |                       |   |             |             |
| Designed for standard cylinder heads   | 1.50  | 64790-1               | 8 - 64750L-1<br>8 - 64750R-1            | 1 - 64618-2 | 1 - 99008-1 |
| Designed for standard cylinder heads   | 1.60  | 64791-1               | 8 - 64751L-1*<br>8 - 64751R-1*          | 1 - 64618-2 | 1 - 99008-1 |
| Designed For Stage IV, Stage V (Except Max Wedge), Stage VI, B-1/Bs, and Indy SR Cylinder Heads (Intake Rocker Arms Have .290" Offset) | 1.50  | 64792-1               | Int.:<br>4 - 64765L-1<br>4 - 64765R-1   | 1 - 64618-2 | 1 - 99008-1 |
|  |       |                       | Exh.:<br>4 - 64750L-1<br>4 - 64750R-1   |             |             |
| Designed For Stage IV, Stage V (Except Max Wedge), Stage VI, B-1/Bs, and Indy SR Cylinder Heads (Intake Rocker Arms Have .290" Offset) | 1.60  | 64793-1               | Int.:<br>4 - 64766L-1*<br>4 - 64766R-1* | 1 - 64618-2 | 1 - 99008-1 |
|  |       |                       | Exh.:<br>4 - 64751L-1*<br>4 - 64751R-1* |             |             |



VALVE TRAIN

## New! Shaft Mount, Extruded Aluminum Rocker Arms - Ford FE V-8, 352-428

Crane Cams upgrades their Ford FE 352-428 V8 rocker arms offerings with a new kit incorporating aluminum rocker arms designed with our Quick-Lift geometry. This will lift the valves off the seats quicker, promoting better torque and horsepower, without compromising reliability. These rocker arms have the conventional Ford adjustable 1.76:1 ratio, incorporate roller tips, and are also equipped with cup-type valve lash adjusters that permit the use of ball-and-ball configuration pushrods. The increased stiffness of modern heavy wall pushrods can now be incorporated into your FE valve train, also increasing power and durability, with better upper RPM stability.

This kit is designed for the Ford iron "Low Rise" cylinder heads, and the Edelbrock aluminum heads. They will also fit the Ford FE Tunnel Port heads, if you're fortunate enough to have a set of them. The standard oiling configuration is maintained for bolt-on installation. Each kit contains 8 intake rockers, 8 exhaust rockers, 2 steel rocker arm shafts, a set of steel billet stands that capture the ends of each shaft for added stability, all mounting hardware, a checking pushrod, plus installation lubricants and complete instructions.

- Increase horsepower, torque, rpm and throttle response
- Roller tip for accurate valve stem tip tracking
- Machined steel valve lash adjusters included
- Rockers made from CNC machined, extruded billet, heat-treated aluminum
- Machined steel, hardened main shafts
- Each shaft end fully supported by steel billet shaft stands
- 1.76:1 ratio
- Stock oiling for maximum lubrication
- Fits FE iron "Low Rise" plus new Edelbrock® aluminum heads (Does not fit Stock Medium or High-Riser heads)
- Complete kit includes shafts and all hardware
- Easy bolt-on installation with no machining required



| Application  | Ratio        | Complete Set Part No. |
|--|--------------|-----------------------|
| <b>Ford-Mercury V-8 63-76, FE 352-360-390-406-410-427-428 cu. in</b>   |              |                       |
| Designed For standard Low-Rise cylinder heads and Edelbrock aluminum cylinder heads<br>This is a complete installation kit including 8 intake rocker arms, 8 exhaust rocker arms, 2 steel rocker shafts, steel billet shaft stands that support the ends of the shafts, all mounting hardware (studs, nuts, washers, shims, spacers, etc.) and complete instructions. No machining required. | 1.76         | 34791-1               |
| <b>Pro-Series one piece ball-and-ball end pushrods recommended for use with these rocker arms are:</b>   |              |                       |
| For hydraulic lifters  | (9.150" oal) | 95819-16              |
| For Crane hydraulic roller lifters   | (8.450" oal) | 95805-16              |
| For mechanical lifters   | (9.150" oal) | 95819-16              |
| For Crane roller lifters   | (9.050" oal) | 95817-16              |
| New rocker shafts available separately   |              | 34618-2               |

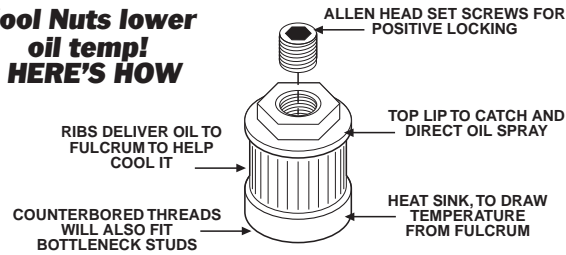
**TECH TIP:** Due to various modifications to racing engines, custom length pushrods may be required. See page 305 for special pushrod ordering instructions.

# Rocker Arm Adjusting Nuts, Screws

## Steel Rocker Arm Adjusting Nuts, "Kool Nuts™"

Crane's locknuts for stamped steel rocker arms are available in self-locking type standard configurations, and in our patented **Kool Nut™** oil deflection design. These direct the pressure-fed oil flow to the pivot ball-rocker arm interface, resulting in superior lubrication and cooling in this critical area.

**Kool Nuts lower oil temp! HERE'S HOW**



| Stud Dia. & Thread | Description  | Part No. |
|--------------------|--|----------|
| 5/16"-24           | Self locking   | 99772-16 |
| 3/8"-24            | Self locking   | 99770-16 |
| 3/8"-24            | <b>Kool Nuts™</b> with oil deflector for improved cooling and lubrication. Counterbored on bottom to also fit bottleneck studs | 99768-16 |
| 7/16"-20           | Self locking   | 99771-16 |
| 7/16"-20           | <b>Kool Nuts™</b> with oil deflector for improved cooling and lubrication. Counterbored on bottom to also fit bottleneck studs | 99769-16 |

VALVE TRAIN

## Shaft-Type Rocker Arm Adjusting Screws

Crane shaft-type rocker arm adjusting screws are precision machined from premium steel billet material and selectively hardened to provide maximum strength. These screws are extremely lightweight and drilled for oiling when necessary.



| Stud Dia. & Thread | Ball/Cup Diameter | Description  | Part No.   |
|--------------------|-------------------|--|------------|
| 3/8"-24            | 5/16" ball        | Chrysler V-8 "LA", "B", and 426 Hemi, with locknut   | 99802-16   |
| 3/8"-24            | 5/16" cup         | For Sportsman Series shaft mount rocker arms and Ford FE V8 332 through 428 with <b>34791-1</b> rocker arm set | 99785-16   |
| 3/8"-24            | 5/16" cup         | For Pro Series shaft mount rocker arms   | 99785-16   |
| 3/8"-24            | 3/8" ball         | Chrysler V-8 "LA", "B", and 426 Hemi, with locknut (For severe duty applications, special pushrods required)   | 99780-16   |
| 7/16"-20           | 5/16" ball        | Chrysler V-8 "LA", "B", and 426 Hemi, with locknut (For repair or ratio modification of rocker arms)           | 66770AS-16 |
| 7/16"-20           | 3/8" ball         | Ford V-8 332 thru 428, with locknut, for <b>34772-16</b> ductile iron rocker arms                              | 99680-16   |

## Rocker Arm Adjusting Nuts

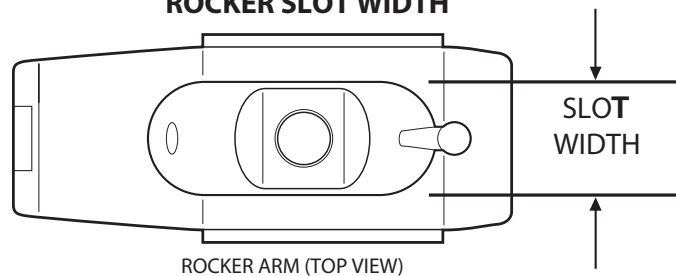
Crane locknuts for Crane's roller-tip, needle bearing aluminum rocker arms feature highest quality metal bar stock, precision machined on our own automatic screw machines and heat treated in house for maximum strength and durability. Each Crane locknut comes complete with an Allen-head set screw for positive jam nut operation.

**NOTE:** Since mid-1985, most Crane Gold Race stud mount extruded rocker arms (except narrow body versions) and Crane Classic rocker arms have had a .600" wide top slot. Crane Energizer stud mount rocker arms have a .570" wide top slot.



| Stud Diameter & Thread | Minimum Rocker Slot Width | Aluminum Rocker Adjusting Nut Part No.                                  | Overall Height | VTS Bar (Stud Girdle) Adjusting Nut Part No.              | Overall Height |
|------------------------|---------------------------|---|----------------|---|----------------|
| 5/16"-24               | .550"                     | <b>99761-16</b>   | .922"          |   |                |
| 3/8"-24                | .550"                     | <b>99788-16</b>   | 1.063"         | <b>99803-8</b>  | 2.013"         |
| 3/8"-24                | .550"                     | <b>99795-16</b><br>(For center bolt valve cover applications)           | .860"          |   |                |
| 3/8"-24                | .600"                     | <b>99764-2</b><br>(For Crane Chevrolet LS1 rocker arm kit)              | .700"          |   |                |
| 3/8"-24                | .600"                     | <b>99760-16</b><br>(For Pontiac rocker arm part no. <b>28750 ONLY</b> ) | 1.078"         |   |                |
| 3/8"-24                | .600"                     | <b>99793-16</b>   | 1.063"         |   |                |
| 7/16"-20               | .550"                     | <b>99790-16</b>   | .922"          | <b>99804-8</b>  | 2.013"         |
| 7/16"-20               | .550"                     |   |                | <b>99805-8</b><br>(For Chevrolet V-8 396 thru 454 intake) | 2.512"         |
| 7/16"-20               | .600"                     | <b>99792-16</b>   | .969"          | <b>99810-8</b>  | 2.013"         |
| 7/16"-20               | .600"                     |   |                | <b>99809-8</b><br>(For Chevrolet V-8 396 thru 454 intake) | 2.637"         |

### HOW TO IDENTIFY ROCKER SLOT WIDTH



# Rocker Arm Shim Kits

## Rocker Arm Bridge Shim Kit

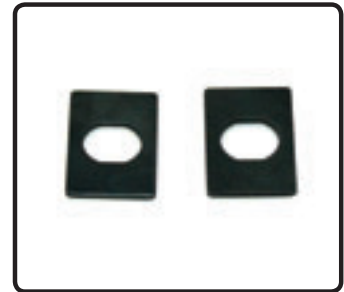
Crane's Rocker Arm Bridge Shim Kit will correct for excessive hydraulic lifter preload on late model American Motors V-8's, and I-6's, and Oldsmobile V-8's with the bridge mounted rocker arm assemblies. This kit will also work on the later model Pontiac 151 I-4's with shoulder bolt mounted rocker arms. Two different thickness shims are included to decrease lifter preload by approximately .030", .060" or .090" depending on the combination of shims being used between the bridge and the cylinder head. Excessive preload may be caused by a camshaft change, valve job, head resurfacing, etc. These shims can be a quick and easy alternative to resorting to different length pushrods.



| Description                       | Part No. |
|-----------------------------------|----------|
| Kit of 32 Rocker Arm Bridge Shims | 99179-1  |

## Rocker Arm Pedestal Shim Kit

Crane's Rocker Arm Pedestal Shim Kit is for use on Ford engines utilizing non-adjustable pedestal mounted rocker arms. The hydraulic lifters in these engines may have excessive preload due to a camshaft change, valve job, head resurfacing, etc. To cure this problem, without resorting to different pushrods, we offer this pedestal shim kit containing two different thickness shims. These shims are placed between the rocker arm pedestal and the cylinder head, and will reduce the preload by approximately .030", .060", or .090". These will fit the Ford V-8, 255-302, 302 H.O., 351W, 351C, 351M, 400, and 370-429-460 engines.



| Description                         | Part No. |
|-------------------------------------|----------|
| Kit of 32 Rocker Arm Pedestal Shims | 99170-1  |

## Needle Bearing Roller Fulcrum Conversion Kit

Crane Cams' drop-in needle bearing fulcrum conversion kit for Ford pedestal-mount rocker arms enables you to retrofit standard non-adjustable rockers with fully rollerized fulcrum assemblies. This eliminates the greatest source of friction in the rocker arm, resulting in less wasted horsepower, lower oil temperatures, greater strength and load carrying abilities, greater vacuum at a given RPM, and better fuel economy. This kit is intended for use with hydraulic lifter and hydraulic roller camshaft applications only.



All hardware is included: New heat treated fulcrums; needle bearing assemblies and hardened hold-down bolts. Pedestal shim kit also included to enable you to optimize hydraulic lifter preload for best performance and reliability. No machining required.

These will fit all pedestal mount factory rocker arms for Ford V-8 engines: 77-00 255 and 302, 77-97 351W, 70-82 351C, 351M, 400, 73-97 370-429-460. Rocker arms NOT included.

| Application                | Part No. |
|----------------------------|----------|
| Complete drop-in assembly. | 36806-16 |

## Rocker Arm Guideplate Conversion Kits

### Converts Pedestal-Mount Dodge and Ford Cylinder Heads to Adjustable Rocker Arms

Crane Cams' rocker arm stud/pushrod guideplate conversion kits enable you to convert late-model Dodge and Ford V-8 engines with pedestal mount rocker arms to an adjustable-type valve train **without machine work or cylinder head removal**. These kits allow standard pushrods to be retained, in most instances, as the guideplate uses a special composite insert that prevents metal-to-metal contact. Each kit includes guideplates, guideplate inserts, studs, stud installation nut, and complete instructions. (*Rocker arms, adjusting nuts, and pushrods are not included.*) These kits are intended for mild performance applications using hydraulic lifter or hydraulic roller cams, and are *not recommended for competition usage*.



#### Description

Dodge 92-02, Magnum V-8 318 (5.2L) and 360 (5.9L) engines with 5/16"-18 threaded stud bosses. Must use **11746-16** or **11759-16** aluminum rocker arms for 3/8" rocker arm studs and 5/16" dia. **36621-16** (heat treated) pushrods.

Dodge 92-02, Magnum V-8 318 (5.2L) and 360 (5.9L) engines with 5/16"-18 threaded stud bosses. Must use **11747-16** or **11755-16** aluminum rocker arms for 7/16" rocker arm studs and 5/16" dia. **36621-16** (heat treated) pushrods.

Dodge Aluminum Magnum and Crate Motor cylinder heads with 3/8"-16 threaded stud bosses. Must use **11746-16** or **11759-16** aluminum rocker arms for 3/8" rocker arm studs and 5/16" dia. **36621-16** (heat treated) pushrods.

Ford V-8 77-00, 255-302, 302 H.O., 351W engines. Will accept 3/8" stud die-formed steel or Crane aluminum rocker arms and 5/16" diameter pushrods.

Ford V-8 77-00, 255-302, 302 H.O., 351W engines. Will accept 7/16" stud Crane aluminum rocker arms and 5/16" diameter pushrods.

Ford V-8 70-82, 351C, 351M, 400, and Ford V-8 72-97, 370-429-460 engines. Will accept 7/16" stud die-formed steel or Crane aluminum rocker arms and 5/16" dia. pushrods.

Ford V-8 72-97, 370, 429, 460 Engines. Will accept 7/16" stud die-formed steel or Crane aluminum rocker arms and 3/8" diameter pushrods.

Replacement guideplate insert for 5/16" diameter pushrods (included in kits)

Replacement guideplate insert for 3/8" diameter pushrods (included in kits)

#### Part No.

**36655-16**  
(Drawing A)

**36656-16**  
(Drawing A)

**70655-16**  
(Drawing A)

**36655-16**  
(Drawing A)

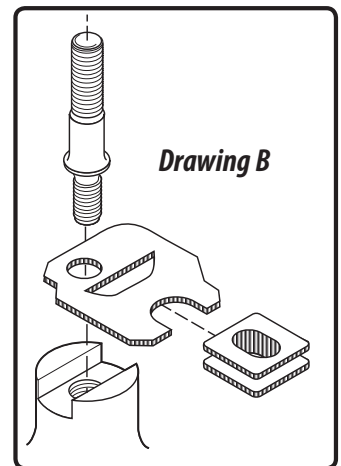
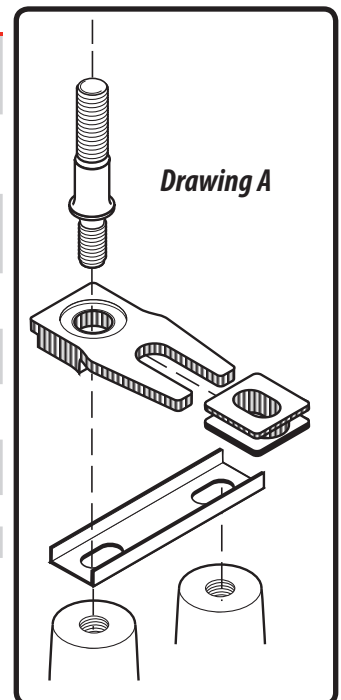
**36656-16**  
(Drawing A)

**52655-16**  
(Drawing B)

**35655-16**  
(Drawing B)

**52655GB-16**

**35655GB-16**



# Rocker Arm Stud Conversion Kits

## Rocker Arm Conversion Stud Kits for Big-Block Chevy Gen V & VI V-8, 454-502 cu.in. and 8.1 Litre V-8

### Converts Non-Adjustable Chevrolet Gen V & VI 454-502 and 8.1L V-8 Engines to Adjustable Rocker Arms

Chevrolet's 1991-00 Gen V and VI, 454-502 and 01-08 8.1 litre big-block V-8 engines offer great performance potential but are handicapped by their non-adjustable, self-aligning rocker arms and valve train. In stock form this system works great, but for performance applications or any instance where an aftermarket camshaft and valve train are called for, the answer is "no way"!

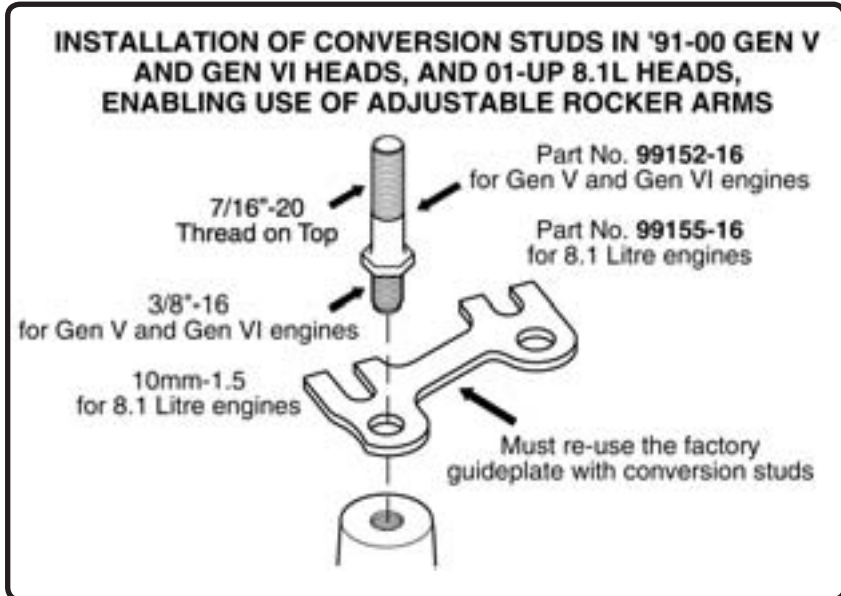
Now Crane Cams offers an ingenious, simple, easy and low-cost way to convert these non-adjustable valve train engines to the obvious performance advantages of high strength, screw-in rocker studs, pushrod guideplates, and die-formed steel rockers or roller fulcrum, aluminum rocker arms.

These are unique rocker arm studs that replace the stock studs without retapping, machining or removal of the cylinder heads.

For the Gen V and VI, rocker arm stud kit **99152-16** is made with a 3/8" diameter bottom thread that bolts directly into the stock rocker bolt location. On top is a 7/16" threaded stud end that allows you to install any adjustable Chevy big-block rocker directly onto the stud. Factory pushrod guideplates must be used to correctly align the pushrods. You can use part no. **13634-16** heat treated pushrods or 3/8" diameter stock pushrods from any big-block Chevy V-8 equipped with adjustable rockers.

The Crane **99152-16** "big-and-small" studs are not recommended for use in competition applications, or with valve spring open pressures over 480 lbs. For those applications use **99157-16** 7/16" x 7/16" studs (you must drill and re-tap new threads in the heads) and **13650-1** guideplates.

For the 2001-08 8.1 litre engines, rocker arm stud kit **99155-16** incorporates a 10mm-1.5 bottom thread that bolts into the stock rocker stand location. The 7/16"-20 top thread again allows you to use any adjustable Chevy big-block rocker. Our **26640-16** Pro Series one piece heavy wall heat treated pushrods are recommended for proper valve train geometry.



VALVE TRAIN

#### Application

Chevrolet V-8 91-00, 454 and 502 Gen V and Gen VI Engines

Chevrolet V-8 01-08, 8.1 Litre Engines

#### Part No.

**99152-16**

**99155-16**



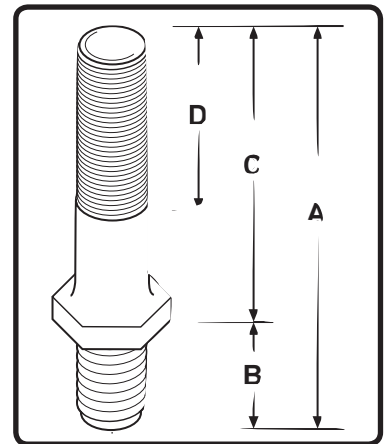
## Rocker Arm Studs

Crane's screw-in rocker arm studs eliminate problems resulting from press-in studs pulling out at high RPM and in high valve spring pressure applications. Made from high quality alloy steel, Crane studs are precision machined and heat treated for reliable operation with today's valve train loading. Specially machined threads and shoulder area assures firm and positive rocker arm support with minimum movement or distortion.

The **99148** studs are used to convert Chevrolet 60° V-6 80-94, 2.8-3.1L engines with non-self aligning 10mm stud rocker arms to use adjustable narrow body 3/8" stud rocker arms without cylinder head machining.



| Top Stud Diameter & Thread   | Bottom Stud Diameter & Thread | Dim. A | Dim. B | Dim. C | Dim. D | Part No.        |
|--|-------------------------------|--------|--------|--------|--------|-----------------|
| 3/8"-24  | 5/16"-18                      | 2.313  | .813   | 1.500  | .875   | <b>99146-16</b> |
| 3/8"-24  | 3/8"-16                       | 2.313  | .813   | 1.500  | .875   | <b>99145-16</b> |
| 3/8"-24  | 10mm-1.5                      | 2.384  | .813   | 1.572  | .582   | <b>99148-16</b> |
| 3/8"-24  | 7/16"-14                      | 2.396  | .700   | 1.750  | .806   | <b>99156-16</b> |
| 7/16"-20   | 5/16"-18                      | 2.313  | .813   | 1.500  | .875   | <b>99147-16</b> |
| 7/16"-20   | 7/16"-14                      | 2.560  | .800   | 1.760  | .860   | <b>99157-16</b> |
| 7/16"-20   | 3/8"-16                       | 2.650  | .750   | 1.900  | 1.000  | <b>99152-16</b> |
| (Conversion stud for Chevrolet Gen V and VI, must use factory guideplates, not recommended for applications with over 480 pounds open valve spring pressure, no machining required.) |                               |        |        |        |        |                 |
| 7/16"-20   | 10mm-1.5                      | 2.650  | .750   | 1.900  | 1.000  | <b>99155-16</b> |
| (Conversion stud for Chevrolet 8.1 litre V-8, must use factory guideplates, no machining required.)  |                               |        |        |        |        |                 |
| 7/16"-20   | 7/16"-14                      | 2.670  | .740   | 1.930  | 1.060  | <b>99159-16</b> |



## Pro Series Rocker Arm Studs

Crane Cams professional quality, Pro-Series rocker arm studs feature an extra large radii for reduced stud flex, even with today's extreme valve spring pressures and high rpm racing engine operating levels. Our Pro-Series rocker studs are precision manufactured from 190,000 P.S.I. strength alloy steel material with rolled threads, and precise top-to-bottom concentricity. These are state-of-the-art items designed and priced for those seeking the highest quality parts available. The **99151** stud has a longer than normal unthreaded portion in the top section, providing superior support and stability for the rocker arm fulcrum.



| Top Stud Diameter & Thread | Bottom Stud Diameter & Thread | Dim. A | Dim. B | Dim. C | Dim. D | Part No.        |
|----------------------------|-------------------------------|--------|--------|--------|--------|-----------------|
| 3/8"-24                    | 8mm-1.25                      | 2.157  | .720   | 1.437  | .625   | <b>99154-16</b> |
| 3/8"-24                    | 8mm-1.25                      | 2.360  | .615   | 1.745  | .800   | <b>99158-16</b> |
| 7/16"-20                   | 7/16"-14                      | 2.650  | .750   | 1.900  | 1.000  | <b>99153-16</b> |
| 7/16"-20                   | 7/16"-14                      | 2.700  | .800   | 1.900  | .800   | <b>99151-16</b> |

# Timing Chains and Components

## **Performance Steel Billet, CNC Machined, Roller Timing Chain Sets**

Crane Performance Steel Billet Gear and Roller Chain Sets offer the precision, strength and accuracy of billet steel, CNC machined camshaft and crankshaft sprockets with the strength, friction reduction and wear resistance of a double-row, roller timing chain. Most kits include a seven keyway crank sprocket for easy degreasing of your camshaft. Where applicable, most sets are machined for, and include, a thrust shim.

**Note:** Due to the increased width of the sprockets and chain, clearance must be checked between the timing set and the block casting. Some applications may require minor grinding of the block for clearance.



| Application  | Set Part No. |
|--|--------------|
| <i>Chevrolet 90° V-6 78-86, 200 thru 262 cu. in. and Chevrolet V-8 55-87, 262 thru 400 cu. in.</i>                               | 11975-1      |
| <i>Chevrolet 90° V-6 78-86, 200 thru 262 cu. in. and Chevrolet V-8 55-87, 262 thru 400 cu. in. with thrust bearing</i>           | 11976-1      |
| <i>Chevrolet V-8 87-91, 305 and 350 cu. in. with Factory Hydraulic Roller Camshaft</i>   | 10975-1      |
| <i>Chevrolet V-8 65-95, 396-402-427-454-502 cu. in. (including Gen V)</i><br>(NOTE: Does not fit Gen VI or 8.1L)                 | 13975-1      |
| <i>Chrysler Hemi V-8 51-56, 301-331-354 cu. in. and 57-58 392 cu. in.</i>  | 69975-1      |
| <i>Chrysler-Dodge-Plymouth "LA" V-8 64-93, 273-340-360 cu. in. and 67-91, 318 cu. in.</i>  | 69975-1      |
| <i>Chrysler-Dodge Magnum V8 92-02, 5.2-5.9 litre</i>   | 69975-1      |
| <i>Chrysler-Dodge-Plymouth "B" V-8 70-78, 383 thru 440 cu. in. (Three bolt), and Chrysler-Dodge-Plymouth V-8 66-71, 426 Hemi</i> | 68975-1      |
| <i>Ford V-8 73-01, 255 (4.2 L)-302-302 H.O-351W</i>  | 44975-1      |
| <i>Ford V-8 69-82, 351C-351M-400 cu. in.</i>   | 52975-1      |
| <i>Ford V-8 68-97, 370-429-460 cu. in.</i>   | 35975-1      |
| <i>Oldsmobile V-8 64-84, 260-307-330-350-400-403-425-455 cu. in.</i>   | 80975-1      |
| <i>Pontiac V-8 55-81, 265 thru 455 cu. in.</i>   | 28975-1      |

## Pro-Series Steel Billet, CNC Machined, Roller Timing Chain Sets

Crane Cams' Pro-Series Steel Billet Gear and Roller Chain Sets offer the precision, strength and accuracy of billet steel, nitride hardened, CNC machined camshaft and crankshaft sprockets with the strength, friction reduction and wear resistance of a premium quality, German manufactured, double-row, roller timing chain. The billet 4140 steel nitride hardened crankshaft sprocket features nine separate keyway locations, providing up to eight degrees of advance or retard.



| Application   | Set Part No. |
|---|--------------|
| <b>American Motors V-8 66-91, 290 thru 401 cu. in.</b>  |              |
| Complete set with multiple keyway crank sprocket and captured needle bearing thrust washer.   | 86977-1*     |
| <b>Chevrolet 90° V-6 78-86, 200 thru 262 cu.in. and Chevrolet V-8 55-87, 262 thru 400 cu.in.</b>  |              |
| Complete set with multiple keyway crank sprocket and machined to fit supplied thrust washer.  | 11984-1*     |
| Replacement Chain   | 11978-1      |
| Replacement Thrust Washer (.031")   | 11984TW-1    |
| Replacement Thrust Washer (.150")   | 11984TWT-1   |
| Complete set with multiple keyway crank sprocket and captured needle bearing thrust washer  | 11977-1*     |
| Replacement Chain   | 11978-1      |
| <b>Chevrolet LS1/LS6 V-8 97-13, 5.7 Litre and Vortec 4800, 5300, 6000 (will not fit LS2)</b>  |              |
| Complete set with steel billet gears and double roller chain, plus all attaching hardware. Cam sprocket has vernier adjustment. No cam sensor triggers.             | 144984-1*    |
| <b>Chevrolet LS2 (early) V-8 6.0L</b>   |              |
| Complete set with steel billet gears and double roller chain with thrust bearing. Cam sprocket has single trigger cam sensor feature. Crank sprocket has 9 keyways. | 144985-1*    |
| <b>Chevrolet LS2 (late), LS3, LS7, and L92 V-8 6.0-6.2-7.0L Three Bolt</b>  |              |
| Complete set with steel billet gears and double roller chain with thrust bearing. Cam sprocket has four trigger cam sensor feature. Crank sprocket has 9 keyways.   | 144986-1*    |
| <b>Chevrolet V-8 65-95, 396 thru 454 &amp; 502 cu.in. (including Gen V)</b>   |              |
| Complete set with multiple keyway crank sprocket and machined to fit supplied thrust washer. (NOTE: Does not fit Gen VI or 8.1L)                                    | 13984-1*     |
| Replacement Chain   | 13978-1      |
| Replacement Thrust Washer (.031")   | 13984TW-1    |
| <b>Chevrolet V-8 65-95, 396 thru 454 &amp; 502 cu.in. (including Gen V)</b>   |              |
| Complete set with multiple keyway crank sprocket and captured needle bearing thrust washer. (NOTE: Does not fit Gen VI or 8.1L)                                     | 13977-1*     |
| Replacement Chain   | 13978-1      |
| <b>Chevrolet V-8 96-00, 454 (7.4L) - 502 (8.2L) Gen VI</b>  |              |
| Complete set with multiple keyway crank sprocket and captured needle bearing thrust washer.   | 16977-1*     |
| <b>Chevrolet V-8 01-08, 8.1L L18 (Vortec 8100)</b>  |              |
| Complete set with multiple keyway crank sprocket and captured needle bearing thrust washer.   | 26977-1*     |
| <b>Chrysler-Dodge-Plymouth "B" 70-78, 383 thru 440 cu. in. (Three bolt), and Chrysler-Dodge-Plymouth V-8 66-71, 426 Hemi</b>  |              |
| Complete set with multiple keyway crank sprocket and captured needle bearing thrust washer.   | 68977-1*     |
| <b>Ford V-8 73-01, 255 (4.2L), 302, 302 H.O., 351W, 351 SVO</b>   |              |
| Complete set with multiple keyway crank sprocket and machined to fit supplied thrust washer.  | 44984-1*     |
| Replacement Chain   | 11978-1      |

**NOTE:** Due to the increased width of the sprockets and chain, clearance must be checked between the timing set and the block casting. Some applications may require minor grinding of the block for clearance.

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

## Cam Degreeing "Tune-A-Cam" Kit

Everything you need to quickly, easily and accurately degree-in your camshaft for maximum performance. Complete kit contains: precision dial indicator, with custom design base to mount to cylinder head, piston stop, pointer, checking springs, degree wheel and instructions — all in a hard molded plastic carrying case.

| Description                   | Part No. |
|-------------------------------|----------|
| Tune-A-Cam Kit (Complete Kit) | 99030-1  |

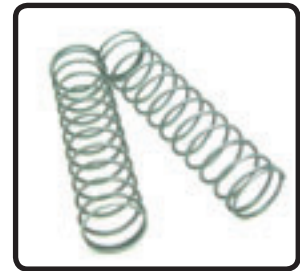


## Checking Spring

### (Low Tension Valve Spring)

This low tension spring can be compressed with a single finger. It is to be used when "mocking-up" a cylinder head with a pair of valves and retainers, for checking such things as: valve lift, valve to piston clearance, and degreeing a cam at the retainer.

| Description                                      | Part No. |
|--|----------|
| Pair of Low Tension Valve Train Checking Springs | 99881-2  |



## Cylinder Pressurization Kit

When changing the valve springs on an assembled engine while using one of our exclusive valve spring compressors, or performing other maintenance that requires your cylinders to be pressurized, this convenient kit provides a quick and economical method to accomplish this. The kit contains a premium quality hose, having an o-ringed 14mm and 18mm threaded adaptor at one end to thread into the spark plug hole, while the other end has a female 1/4" NPT threaded brass fitting to receive your choice of quick-disconnect adaptors. There's also a long 14mm threaded adaptor for aluminum heads, to provide better sealing and providing superior thread engagement.

| Description   | Part No. |
|---|----------|
| Cylinder Pressurization Kit for cylinder heads having 14 and 18mm spark plugs | 99474-1  |



## Degree Wheel

Crane's degree wheels are made from rigid, durable stamped steel, 9 1/2" in diameter, and come with adapter inserts for 7/16", 1/2", and 5/8" center holes.

| Description                | Part No. |
|----------------------------|----------|
| Degree Wheel with Adapters | 99162-1  |



## Piston Stop

### (Top Dead Center Locator)

Provide a positive stop for the piston when locating true TDC (Top Dead Center), for camshaft degreeing. Made to screw directly into the cylinder head spark plug hole. Machined from brass to prevent piston damage, and incorporating an air bleed hold to prevent compression build-up while turning the engine over.

| Description                 | Part No. |
|-----------------------------|----------|
| TDC Piston Stop 12mm thread | 99410-1  |
| TDC Piston Stop 14mm thread | 99412-1  |



## Pushrods, Adjustable Checking - See page 310

### Oil Pump Primer

Successful engine builders know that externally priming the oiling system of a new engine eliminates dangerous "dry" initial start-up! Our Chevrolet oil pump primer tool features a special bushing that seals the oil galley and completely primes and pressurizes the entire engine oil system. All models feature an upper collar that also prevents oil pump drive side-loading. Use your heavy duty 3/8" drive drill motor to build oil pressure and uniformly distribute oil throughout the engine for initial start-up..



| Application  | Part No. |
|--|----------|
| Chevrolet V-8, 262 thru 400, 396 thru 454, and 90° V-6 | 99010-1  |
| Ford V-8, 221 thru 302, Boss 302, (1/4" hex)           | 99012-1  |

### Organizer Tray for Valve Train

Lightweight tray accepts a wide range of rockers, pushrods, adjusting nuts, lifters and spark plugs. Integral handholds make handling easier. Resistant to heat, oils and solvents.



| Description                | Part No. |
|----------------------------|----------|
| Valve Train Organizer Tray | 99015-1  |

### Valve Spring Compressors

#### For Small Block Chevrolet

**Models to fit all production small block V-8 and V-6 engines – including late model LS1/LS2/LS6 & Vortec**

This handy tool is designed for removing valve springs while the cylinder head is attached to the engine. This facilitates the installation of new valve springs in substantially less time than it takes using a conventional valve spring compressor. In fact, it reduces the spring removal and replacement time on F-body cars to one-quarter of the time required for other tools. Use a ratchet or impact wrench to compress the springs. The rugged heat-treated steel fixtures are precision CNC-machined to assure proper seating on the cylinder head & valve spring retainer.



| Application   | Part No. |
|---|----------|
| 1957-96 Chevrolet 262-400 V-8, including LT1/LT4 and Chevrolet 200-229-4.3L 90° V-6 | 99473-1  |
| 1997-up Chevrolet LS1/LS2/LS6 5.7L V-8 and Vortec 4800, 5300, 6000 V-8              | 99472-1  |
| Chevrolet L92/LS3 cylinder heads for LS-series V-8                                  | 99475-1  |
| 2003-up Chrysler-Dodge 5.7 – 6.1 litre Hemi V-8                                     | 99476-1  |



# Tools

## Valve Spring Height Micrometer

Rotating the tool expands it to simulate installed height. The micrometer measurements make it extremely easy to read. The tool will measure from 1.600" to 2.100" installed height with an accuracy of .001".

| Description                    | Part No. |
|--------------------------------|----------|
| Height Micrometer 1.600-2.100" | 99019-1  |



## Valve Spring Seat Machining Tool Bodies

These carbide-tipped tools machine the valve spring seat to the precise diameter and depth for high performance spring applications. Crane Machining Tool Arbors are required to pilot these tools in the valve stem bore.

| Application                      | Part No. |
|----------------------------------|----------|
| Machines 1.320" O.D., .630" I.D. | 99404-1  |
| Machines 1.475" O.D., .630" I.D. | 99403-1  |
| Machines 1.570" O.D., .630" I.D. | 99406-1  |
| Machines 1.640" O.D., .630" I.D. | 99405-1  |
| Machines 1.760" O.D., .630" I.D. | 99414-1  |



VALVE TRAIN

## Valve Spring Seat Machining Tool Arbors

These arbors accurately pilot the Valve Spring Seat Machining Tools by locating in the valve stem bore.

| Application                 | Part No. |
|-----------------------------|----------|
| Use with 5/16" valve stems  | 99026-1  |
| Use with 11/32" valve stems | 99027-1  |
| Use with 3/8" valve stems   | 99028-1  |
| Use with 8mm valve stems    | 99025-1  |



## Valve Spring Tester Calibration Spring

This high quality steel valve spring includes a graph plotted from this exact calibration spring, enabling you to check the accuracy of your spring testing equipment.

| Description                                   | Part No. |
|---|----------|
| Spring Tester Calibration Spring w/Data Sheet | 99851-1  |



## Adjustable Vacuum Advance Kits

Now you can actually tailor your ignition system to meet a wide variety of driving conditions and requirements with these unique, easy-to-install adjustable vacuum advance kits. Comes complete with adjustable vacuum canister, featuring the unique adjustable vacuum diaphragm, three sets of advance weight springs, and a 3/32" allen wrench, plus complete instructions for installation and operation.

The adjustability provided by these kits permits you to run the maximum ignition advance throughout the RPM range, without encountering detonation. Improved performance, efficiency, and dependability are the major benefits obtained. Once the kit is installed, you can also quickly compensate for changes in fuel quality and altitude.



| Application   | Part No. |
|---|----------|
| Delco Point Type (Includes Limiter Plate)                           | 99601-1* |
| Ford V-8 73-85 with Electronic Ignition (without computer controls) | 99607-1* |
| G.M. H.E.I. (Includes Limiter Plate)                                | 99600-1* |

## Vacuum Timing Limiter Plate

Here's an easy-to-install item that allows you to limit the amount of vacuum timing needed for certain engine/vehicle applications using the Crane Adjustable Vacuum Kit.

With Crane's Adjustable Vacuum Advance Kits, the adjustment made through the vacuum port of the cannister adjusts the rate of vacuum timing change as engine vacuum changes.

The Crane Vacuum Timing Limiter plate actually changes the amount of that vacuum timing. This is especially helpful with applications such as high compression ratio engines, heavy engine loads (such as very low numerical rear axle gearing) or heavy vehicle weights such as motor homes, trucks with trailers, etc..

Each plate notch will shorten the amount of vacuum timing by 2°. It will also advance the initial timing to 2° because of the change in the starting position of the breaker plate or magnetic pick up.



| Application  | Part No. |
|--|----------|
| Vacuum Timing Limiter Plate — for GM/Delco V-8 point-type and H.E.I. ignition distributors | 99619-1* |

## Vacuum Reserve System

**Is That "Big Cam" Giving Your Vacuum Assisted Power Brakes And Other Accessories Problems? Our Original Vacuum Reserve System Delivers Needed Vacuum Storage!**

This unique kit allows you to store needed vacuum to operate your vacuum assisted power brakes, even with a more radical camshaft! Crane's Vacuum Reserve System utilizes a one-way check valve that stores engine vacuum until it's needed . . . like when you apply the brakes and your engine can't supply the needed vacuum! Compactly sized at just 5" x 7", this unit can be installed in tight areas. Comes complete with all hardware. Power brake hose not included.

| Application  | Part No. |
|--|----------|
| Vacuum Reserve System, Complete Kit including Fittings | 99590-1  |



\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

# About Valve Springs

## Valve Springs . . . Hardly An "Open & Shut" Subject!

Valve springs are at least as important as any other major performance component in an engine; yet, they are probably the most misunderstood and neglected. Incorrect or worn valve springs cause conditions that are often misdiagnosed as fuel or ignition problems. When all of the fuel and ignition system components have been replaced; and the "gremlins" are still in the engine, chances are the valve springs are either set up at the wrong tension, worn out, or just the wrong spring for the cam profile. This last factor is often the most puzzling, yet offers the greatest chance for significant improvements in engine performance.

Due to their highly stressed design (valve springs are coiled from specially heat-treated, super-clean, super-sophisticated alloys of steel), valve springs have several critical characteristics that are generally called "resonant frequency" or "natural harmonics". These are similar to those of a lead crystal goblet. By sounding a specific frequency musical note, the goblet will shatter. An undampened valve spring run at steady speed at its natural frequency will either self-destruct or lose enough of its strength and tension that it can no longer properly control the valve action.

At Crane, we design springs to maximize the performance of Crane Cams. In doing so, we put the resonant frequency outside of the intended operating range of the spring. This is not

always the case, especially with springs produced by the OE manufacturers for production vehicles.

For years, especially before onboard computers, valve springs were used as "rev-limiters" to help the OE manufacturers in their efforts to minimize warranty problems caused by over-enthusiastic drivers. These springs usually had a resonant frequency located somewhere in the 4400-5200 RPM range. When a vehicle was accelerated, the engine would rev through the low end and mid-range perfectly until the engine speed hit somewhere in the 4400-5200 RPM range. Then it would either just stop pulling or the engine would start misfiring badly. This was typically diagnosed as a fuel or ignition problem when, in actuality, it was the factory's valve spring resonant frequency helping protect the engine.

A good set of valve springs, even on an otherwise stock engine, will usually provide a significant performance improvement throughout the RPM range as well as a marked improvement in fuel economy, smoother idle, improved cold start, and better cold weather driveability.

What is most important is selecting a valve spring with the correct seat pressure, open pressure, and spring rate for the camshaft in the engine. At Crane Cams, we constantly test and evaluate various cam lobe profiles vs. spring combinations, so that we can give you the right spring recommendations for

your cam. However, with over 80,000 profiles in our camshaft lobe library and over 60 different valve springs in our catalog, it is impossible for us (or any company) to test every possible combination. Because of this, we offer guidelines on how to select springs for custom applications (special valve stem lengths, weights, etc.). It is in this area of the unknown or untested that the greatest opportunities exist of finding your own special combination that yields a power and performance increase beyond your competitors.

What we're talking about is virtually free HP just for choosing the right springs!

If you have purchased a cam (Crane or another brand), and it doesn't seem to perform to your expectations, it is quite likely a different valve spring might be able to make an improvement (It could also be a problem with pushrod stiffness and/or rocker arm geometry.) If you are pushing the envelope in any area of motorsports competition, it is necessary to constantly evaluate various combinations of engine components. Frequently, racers ignore the effects of the valve springs on the dynamics of the valvetrain. By experimenting with various valve spring combinations you will probably find the most power for your money and/or time. In addition, you just might cure that "fuel system" or "ignition system" problem you thought you had!





## Valve Spring Rate and How to Use It

The rate of a spring is the force necessary to compress (or deflect) the spring a specified distance. For example, if we say that a spring has a rate of 250 lbs. per inch (250#/in.), it will take 250 pounds of force to compress the spring 1 inch. Fortunately, valve springs are coil springs, and coil springs are easy to understand because they have an almost linear spring rate. In other words, if it takes 400 lbs. to compress a spring 1 inch, it only takes 100 lbs. to compress the spring .250 in., 200 lbs. to compress it .500 in., and 300 lbs. to compress it .750 in. Some people refer to spring rate as "stiffness", and it is the understanding of this spring characteristic that is most important in selecting and setting up springs on an automotive cylinder head.

Frequently a taller, softer spring is a better choice for a performance application than a short, stiff spring.

### **Consider the following possibility:**

A vehicle owner wants to use a .520" valve lift camshaft in an application and is considering different valve springs.

**Spring A** has an installed pressure of 125# at 1.750" installed height and has a rate of 280#/in.

**Spring B** has an installed pressure of 115# at 1.750" installed height with a rate of 410#/in.

At .520" lift, **Spring A** has an open pressure of 271# (this is 125# of seat pressure plus  $[\.520" \times 280\#/in] = 146\#$  from spring compression). At .520" lift, **Spring B** has an open pressure of 328# (this is 115# of seat pressure plus  $[\.520" \times 410\#/in] = 213\#$  from spring compression). Both of these springs would work on a street performance application requiring good performance and reliability. However, **Spring A** with a lower open pressure of 271# could probably be used on a cylinder head with pressed in rocker studs; while **Spring B** would definitely require screw in studs for adequate reliability. **Spring B** would probably provide better performance above 6000 RPM (especially with relatively heavy valves) because of its higher open pressure of 328#. **Spring A** would probably idle a little smoother with higher vacuum, especially if a high pressure oil pump or thicker oil is used. This is a result of **Spring A**'s higher seat pressure of 125#.

As you can see from the example above, there are often different springs that can offer different benefits on the same cam profile. **Spring A** offers good performance over a wide RPM range at a lower total valvetrain cost (this assumes that the heads were not machined for screw in studs). **Spring B** offers the possibility of somewhat improved performance beyond 6000 RPM. The vehicle owner needs to decide what he wants from his vehicle and what he wants to spend.

In all-out racing, we frequently see the need for different springs on the same lobe profile depending on the anticipated RPM range. Frequently, circle track racers will run two different tracks with the same engine but with different rear end gearing. Often there can be as much as 500-700 RPM difference in the top end engine speed between the two tracks. It is not uncommon to find that the car runs better on the track with the lower peak RPM using a spring with a lower seat pressure and softer rate. At the track where the engine runs to the higher speed, the engine needs more seat pressure and a stiffer spring rate. Every combination of engine, chassis, and track is different. Significant performance improvements can often be achieved by experimenting with valve springs. If you aren't paying attention to your springs, the guy winning most of the races probably is!

# Choosing Valve Springs

## How to Select a Valve Spring

With the many choices of aftermarket cylinder heads, most with longer-than-stock length valves, the recommendation of a specific spring for a specific cam is almost impossible. It is now necessary to select the spring that will best fit the cylinder head configuration. We offer the following as general guidelines only:

- 1) **"FLAT FACED LIFTER" cam/lifter applications (Street & Street/Strip) seat pressures**
  - a. Small Block: 105-125# Seat Pressure
  - b. Big Block: 115-130# Seat Pressure (Note: Big Block applications need higher seat pressures due to their larger, heavier valves.)
- 2) **"FLAT FACED LIFTER" Open pressures should not exceed 330# open pressure (sustained after spring break-in for acceptable cam and lifter life.**
  - a. Open pressures should be a minimum of 220# for applications up to 4000 RPM.
  - b. For good performance above 4000, open pressures should be at least 260# with stock weight valves. (Lightweight valves require less spring open pressure.)
  - c. Spring open pressures over 280# can cause pressed-in studs to come loose; therefore, we recommend screw-in studs for open pressures above 280#.
- 3) **HYDRAULIC ROLLER CAMS require higher spring seat pressures to control the heavier roller tappets and the more aggressive opening and closing rates available to roller cam profiles.**
  - a. Small Block applications: 120-145# seat pressure
  - b. Big Block applications: 130-165# seat pressure
- 4) **HYDRAULIC ROLLER CAMS use higher open pressures to control the high vertical opening inertia of the heavier roller followers.**
  - a. Small Block applications need at least 260# for general driving applications up to 4000 RPM.
  - b. Moderate performance small block applications like 300-360# open.
  - c. Serious small block applications can tolerate 400-425#\* open pressures and still expect reasonable valve train life when top quality springs, pushrods, and lubricants are used.
  - d. Big Block applications need at least 280# for general driving applications up to 4000 RPM.
  - e. Moderate performance big block applications like 325-375# open pressure.
  - f. Serious big block performance applications can tolerate 450#\* open pressure and still expect reasonable valve train life when top quality springs, pushrods, and lubricants are used.

\*Note: Open pressures in excess of 360# require the use of roller tappet bodies made of billet steel. Crane hydraulic roller and solid roller tappets are made from heat treated steel billet to withstand the stresses of high-performance use. Most stock hydraulic roller tappet bodies are made of cast iron and cannot tolerate high spring loads.

### 5) **MECHANICAL ROLLER CAM/LIFTER**

Applications are generally for serious street/strip use and full competition. Most are not used in daily-drivers where day-to-day reliability is stressed. Instead, most of these cams are intended for winning performance. These cams are designed with very aggressive opening and closing rates. High seat pressures are necessary to keep the valves from bouncing when they come back to the seat. In all cases, the valve action and spring pressures required mandate the use of high-strength, one-piece valves. However, Crane does offer the SR-Series of Street Roller camshafts intended for daily usage.

- a. **Seat Pressures** are determined by valve/retainer weight, engine RPM and life expectancy of components before replacement is required. Milder roller cams require 165# on the seat as an absolute minimum. 180-200# is common for most modest performance applications. 220-250# is common for most serious sport categories and some circle track professional categories. Pro-Stock and Blown Alcohol/Fuel drag applications use as much as 340-500# on the seat.
- b. **Open Pressures** need to be high enough to control the valvetrain as the lifter goes over the nose of the cam. Ideally, the minimum amount of open pressure to eliminate or minimize valvetrain separation is desired. Any excess open pressure only contributes to pushrod flex, which can aggravate valvetrain separation. For serious racing applications this can be determined only by experimentation and track testing. For general guidelines we offer the following
  - i. Street/Strip performance with long cam/lifter life desirable, 350-450# open.
  - ii. Circle track and moderate bracket racing 450-600@ open.
  - iii. Serious drag racing and limited distance circle track racing 600# and more.

| O.D.   | I.D.  | Damper | Seat Press.     | Open Press.     | Coil Bind | Rate (lbs/in.) | Max Net Lift | Application   | Part No.         |
|--|-------|--------|-----------------|-----------------|-----------|----------------|--------------|---|------------------|
| <b>Single Valve Springs</b>  |       |        |                 |                 |           |                |              |   |                  |
| 1.000  | 0.730 | No     | 62 lbs @1.475   | 130 @ 1.025     | 0.910     | 151 lbs/in.    | 0.475        | Ford Duratec 1.8 – 2.3 litre DOHC 4V 4 cyl. included in <b>903-2007</b> valve spring and retainer kit.  | <b>96845-16</b>  |
| Top: 0.930   | 0.567 |        |                 |                 |           |                |              |   |                  |
| Bottom: 1.025  | 0.662 | No     | 90 lbs @1.470   | 252 @ .970      | 0.900     | 324 lbs/in.    | 0.500        | Ford Modular 4.6 – 5.4 litre DOHC 4V V-8 beehive, ovate wire.   | <b>40830-32</b>  |
| 1.065  | 0.725 | No     | 60 lbs @1.535   | 255 lbs @ 1.063 | 0.987     | 413 lbs/in.    | 0.500        | Chrysler/Dodge Neon DOHC I-4  | <b>180830-16</b> |
| 1.065  | 0.725 | No     | 85 lbs @1.535   | 244 lbs @ 1.135 | 1.014     | 398 lbs/in.    | 0.470        | Chrysler/Dodge Neon SOHC I-4  | <b>158830-16</b> |
| Top: 0.967   | 0.636 |        |                 |                 |           |                |              |   |                  |
| Bottom: 1.096  | 0.765 | No     | 85 lbs @1.640   | 250 @ 1.040     | 1.000     | 275 lbs/in.    | 0.620        | Ford 4.6-5.4L 2 valve & 3 valve V-8 beehive, ovate wire.  | <b>37830-16</b>  |
| 1.255  | 0.870 | Yes    | 114 lbs @1.700  | 340 @ 1.200     | 1.153     | 432 lbs/in.    | 0.487        | Small Block Chevy Street/Strip; RV/Truck Power. Stock dia spring for 1.700" installed ht. .480" max recommended valve lift.                             | <b>99848-16</b>  |
| 1.255  | 0.870 | No     | 124 lbs @1.750  | 374 @ 1.150     | 1.100     | 409 lbs/in.    | 0.640        | Late Model LT-1 w/aluminum heads; LS1 or other alum. heads w/1.770-1.820" inst. hts. <b>XHTCS</b>   | <b>99845-16</b>  |
| 1.255  | 0.870 | Yes    | 125 lbs @ 1.800 | 383 @ 1.200     | 1.100     | 428 lbs/in.    | 0.640        | SB Chevy apps. up to .600" valve lift with stock spring seats. Flat tappets install @ 1.800"; hyd rlr install @ 1.750-1.800" <b>XHTCS</b>               | <b>99846-16</b>  |
| 1.260  | 0.876 | Yes    | 107 lbs @ 1.800 | 348 @ 1.200     | 1.110     | 395 lbs/in.    | 0.600        | SB Chevy hyd rlr w/1.750" installed ht. SB Chevy flat tappet w/1.770-1.800" inst. ht.   | <b>96802-16</b>  |
| 1.265  | 0.775 | Yes    | 125 lbs @ 1.750 | 388 @ 1.250     | 1.100     | 526 lbs/in.    | 0.600        | SB Chevy Performance hydraulic roller cams, PAC enhanced wire   | <b>144846-16</b> |
| Top: 1.055   | 0.650 |        |                 |                 |           |                |              |   |                  |
| Bottom: 1.290  | 0.885 | No     | 130 lbs @ 1.800 | 318 @ 1.200     | 1.140     | 313 lbs/in.    | 0.600        | LS1/LS2 Performance hydraulic roller cams beehive, ovate wire.  | <b>99831-16</b>  |
| 1.435  | 1.035 | Yes    | 107 lbs @ 1.700 | 317 @ 1.150     | 1.037     | 330 lbs/in.    | 0.600        | Various Ford 302-351W V-8's, Ford 300 6cyl, Mopar 360's and Olds 350/400/455  | <b>96803-16</b>  |
| 1.437  | 1.077 | Yes    | 104 lbs @ 1.750 | 229 @ 1.150     | 1.069     | 204 lbs/in.    | 0.620        | Ford V-8 RV and mild street apps. Used w/ <b>96840, 96842, 96843</b> for various hyd roller and flat tappet street/strip and bracket apps.              | <b>96806-16</b>  |
| 1.440  | 1.040 | No     | 98 lbs @ 1.700  | 260 @ 1.200     | 1.080     | 328 lbs/in.    | 0.560        | AMC 6cyl; SB Ford; Olds V-8's; Street/Strip, RV/Truck Power applications.   | <b>99833-16</b>  |
| Top: 1.095   | 0.650 |        |                 |                 |           |                |              |   |                  |
| Bottom: 1.445  | 1.000 | No     | 155 lbs @ 1.880 | 377 @ 1.280     | 1.210     | 370 lbs/in.    | 0.650        | Big Block Chevy and FE Ford, beehive, nitrided ovate wire.  | <b>99832-16</b>  |
| Top: 1.295   | 0.859 |        |                 |                 |           |                |              |   |                  |
| Bottom: 1.450  | 1.014 | No     | 118 lbs @ 1.950 | 375 @ 1.380     | 1.320     | 457 lbs/in.    | 0.580        | Ford 5.0/351W Street/Strip, RV/Truck Power, Beehive   | <b>99841-16</b>  |
| 1.460  | 1.060 | Yes    | 110 lbs @ 1.550 | 303 @ 1.100     | 0.935     | 442 lbs/in.    | 0.605        | Many Pontiac V-8 Street/Strip applications  | <b>99840-16</b>  |
| 1.460  | 1.060 | Yes    | 114 lbs @ 1.800 | 287 @ 1.250     | 1.139     | 310 lbs/in.    | 0.600        | Ford V-8's w/1.770-1.850" installed hts. Used w/ <b>96840</b> and <b>96842</b> for High Perf hyd rlr and solid flat tappet cams.                        | <b>96801-16</b>  |
| 1.500  | 1.086 | Yes    | 113 lbs @ 1.600 | 280 @ 1.150     | 1.000     | 412 lbs/in.    | 0.565        | SB Chrysler; Street/Strip; RV/Truck Power   | <b>99835-16</b>  |
| 1.500  | 1.086 | Yes    | 121 lbs @ 1.800 | 298 @ 1.300     | 1.130     | 354 lbs/in.    | 0.660        | AMC V-8; BB Chevy w/1.880" installed ht: Street/Strip, RV/Truck Power.  | <b>99839-16</b>  |
| 1.539  | 1.125 | Yes    | 129 lbs @ 1.950 | 358 @ 1.200     | 1.130     | 312 lbs/in.    | 0.700        | BB Chevy and BB Chrysler hyd rlr and High Perf flat tappet cams. Use +.050" keepers. Used with <b>96843, 96844</b> inners for several mech roller cams. | <b>96807-16</b>  |
| <b>Inner Valve Springs</b>   |       |        |                 |                 |           |                |              |   |                  |
| The Inner Springs shown below are available separately for "Mix-and-Match" Dual Spring Combinations using "96" part number prefix single valve springs. See specific "96" Dual Springs for correct components. These Inner Springs are not recommended for use with "99" prefix springs. Sold in sets of 16. |       |        |                 |                 |           |                |              |   |                  |
| 0.937  | 0.697 | No     | 29 lbs @ 1.600  | 90 @ 1.000      | 0.925     | 96 lbs/in.     | 0.615        | For use with <b>96801, 96806</b> , Outer Valve Springs  | <b>96842-16</b>  |
| 0.953  | 0.697 | No     | 54 lbs @ 1.500  | 130 @ 1.000     | 0.916     | 132 lbs/in.    | 0.500        | For use with <b>96806, 96807</b> , Outer Valve Springs  | <b>96843-16</b>  |
| 0.970  | 0.700 | No     | 51 lbs @ 1.750  | 134 @ 1.150     | 1.014     | 135 lbs/in.    | 0.676        | For use with <b>96801, 96806</b> Outer Valve Springs  | <b>96840-16</b>  |
| 1.015  | 0.731 | No     | 57 lbs @ 1.800  | 160 @ 1.150     | 1.045     | 155 lbs/in.    | 0.650        | For use with <b>96807</b> Outer Valve Springs   | <b>96844-16</b>  |

# Valve Springs

| O.D.                      | I.D.1 | I.D.2 | Damper | Seat Press.     | Open Press.  | Coil Bind | Max Net Lift<br>w / .060"<br>clearance | Rate<br>(lbs/in.) | Application   | Part No.  |
|---------------------------|-------|-------|--------|-----------------|--------------|-----------|--|-------------------|---|-----------|
| <b>Dual Valve Springs</b> |       |       |        |                 |              |           |  |                   |   |           |
| 1.212                     | 0.900 | 0.674 | No     | 93 lbs @ 1.550  | 266 @ .950   | 0.865     | 0.625                                  | 290 lbs/in.       | Buick V-6 & Buick 350 V-8   | 99891-16  |
| 1.218                     | 0.906 | 0.680 | No     | 91 lbs @ 1.300  | 220 @ .900   | 0.783     | 0.457                                  | 337 lbs/in.       | Early Ford 2.0L SOHC & VW liquid cooled   | 99879-8   |
| 1.297                     | 0.667 | 0.917 | No     | 148 lbs @ 1.800 | 413 @ 1.150  | 1.060     | 0.680                                  | 408 lbs/in.       | LS Performance hydraulic roller camshafts.  | 144838-16 |
| 1.298                     | 0.664 | 0.914 | No     | 151 lbs @ 1.800 | 461 @ 1.150  | 1.080     | .660                                   | 477 lbs/in.       | LS Performance hydraulic roller camshafts, XHTCS material.  | 144847-16 |
| 1.304                     | 0.980 | 0.754 | No     | 96 lbs @ 1.650  | 230 @ 1.150  | 0.927     | 0.663                                  | 215 lbs/in.       | Nissan 4 cyl; Ford 2.3L SOHC  | 99884-8   |
| 1.344                     | 1.000 | 0.730 | No     | 107 lbs @ 1.820 | 274 @ 1.300  | 1.057     | 0.703                                  | 334 lbs/in.       | Small Block Chevy 87-91 L98 and Fast Burn alum. heads w/hydraulic roller cams   | 96887-16  |
| 1.437                     | 1.080 | 0.697 | Yes    | 134 lbs @ 1.750 | 283 @ 1.250  | 1.185     | 0.600                                  | 296 lbs/in.       | Several SB Chevy, SB Ford flat tappet and hyd rlr apps. (96806 outer/96842 inner)   | 96873-16  |
| 1.437                     | 1.080 | 0.697 | Yes    | 128 lbs @ 1.800 | 328 @ 1.200  | 1.115     | 0.625                                  | 322 lbs/in.       | Various hyd rlr & flat tappet street perf. & mild bracket racing. (96806 outer/96843 inner)                                       | 96874-16  |
| 1.437                     | 1.080 | 0.700 | Yes    | 131 lbs @ 1.850 | 345 @ 1.200  | 1.110     | 0.680                                  | 326 lbs/in.       | SB Chevy & SB Ford hyd rlr and flat tappet bracket racing w/long valves or tall assy hts. (96806 outer/96840 inner)               | 96872-16  |
| 1.449                     | 1.075 | 0.794 | No     | 120 lbs @ 1.875 | 394 @ 1.175  | 1.035     | 0.625                                  | 392 lbs/in.       | Hydraulic and mechanical flat faced lifter camshafts, mild hydraulic roller camshafts.  | 99892-16  |
| 1.460                     | 1.060 | 0.697 | Yes    | 126 lbs @ 1.850 | 366 @ 1.250  | 1.175     | 0.615                                  | 404 lbs/in.       | BB Ford and BB Chrysler hyd rlr and flat tappet street/strip use. (96801 outer/96842 inner)                                       | 96877-16  |
| 1.460                     | 1.075 | 0.803 | No     | 130 lbs @ 1.850 | 402 @ 1.150  | 1.080     | 0.710                                  | 391 lbs/in.       | BB Chevy, BB Ford, BB Chrysler premium RV/ Truck Power applications. Flat tappet racing use.                                      | 99893-16  |
| 1.460                     | 1.060 | 0.700 | Yes    | 134 lbs @ 1.900 | 424 @ 1.250  | 1.154     | 0.686                                  | 448 lbs/in.       | High perf hydraulic rollers; Sportsman flat tappet racing, moderate perf solid rollers (96801 outer/96840 inner)                  | 96870-16  |
| 1.465                     | 1.091 | 0.807 | No     | 112 lbs @ 1.650 | 336 @ 1.100  | 0.950     | 0.690                                  | 438 lbs/in.       | AMC 6 cyl, Buick V-8's, many perf cams with short assy hts requiring high lifts and moderate spring rate                          | 99838-16  |
| 1.500                     | 1.050 | 0.726 | No     | 300 lbs @ 2.100 | 1002 @ 1.200 | 1.130     | 0.900                                  | 780 lbs/in.       | Small diameter, low mass, all-out race, Nano-Peened™, Pacaloy wire.   | 961356-16 |
| 1.500                     | 1.050 | 0.726 | No     | 420 lbs @ 2.175 | 1200 @ 1.175 | 1.130     | 1.000                                  | 780 lbs/in.       | Small diameter, low mass, high lift drag race, Nano-Peened™, Pacaloy wire.  | 961355-16 |
| 1.522                     | 1.050 | 0.726 | No     | 400 lbs @ 2.250 | 1252 @ 1.300 | 1.190     | 0.950                                  | 895 lbs/in.       | Small diameter, low mass, all-out race, Nano-Peened™, Pacaloy wire.   | 961360-16 |
| 1.530                     | 1.116 | 0.766 | Yes    | 131 lbs @ 1.900 | 410 @ 1.250  | 1.160     | 0.630                                  | 428 lbs/in.       | BB Chevy hyd and solid flat tappet racing; BBC, BB Ford, & Ford 351/400 hyd rlr cams  | 99890-16  |
| 1.539                     | 1.125 | 0.697 | Yes    | 160 lbs @ 1.900 | 424 @ 1.300  | 1.145     | 0.700                                  | 444 lbs/in.       | BB Chevy and BB Chrysler solid street rollers or hyd rlr w/+.050" taller inst. ht. (96807 outer/96843 inner)                      | 96879-16  |
| 1.539                     | 1.125 | 0.731 | Yes    | 200 lbs @ 1.900 | 508 @ 1.250  | 1.152     | 0.680                                  | 480 lbs/in.       | Various solid rlr applications for Pro Street & bracket use (96807 outer/96844 inner)   | 96878-16  |
| 1.540                     | 1.140 | 0.754 | Yes    | 144 lbs @ 1.900 | 403 @ 1.300  | 1.175     | 0.665                                  | 434 lbs/in.       | Various Big Block hyd rlr applications  | 99895-16  |
| 1.540                     | 1.140 | 0.760 | Yes    | 150 lbs @ 1.900 | 560 @ 1.150  | 1.135     | 0.755                                  | 528 lbs/in.       | Various Big Block hyd rlr apps. Harmonics optimized for sustained high RPM marine use. Solid flat tappets with tall assembly hts. | 99896-16  |
| 1.540                     | 1.115 | 0.729 | Yes    | 224 lbs @ 1.950 | 638 @ 1.200  | 1.130     | 0.760                                  | 544 lbs/in.       | Professional roller cam race applications Electro-Polished  | 96883-16  |
| 1.550                     | 1.100 | 0.706 | Yes    | 275 lbs @ 2.000 | 805 @ 1.200  | 1.150     | 0.800                                  | 663 lbs/in.       | Various Small and Big Block roller camshafts, drag racing   | 961226-16 |
| 1.550                     | 1.100 | 0.788 | No     | 250 lbs @ 2.000 | 765 @ 1.200  | 1.150     | 0.800                                  | 644 lbs/in.       | High rate dual spring for aggressive valve train. Premium circle track, Nano-Peened™, PAC enhanced wire.                          | 961325-16 |
| 1.550                     | 1.100 | 0.706 | Yes    | 275 lbs @ 2.000 | 805 @ 1.200  | 1.150     | 0.800                                  | 662 lbs/in.       | High rate dual spring with damper for aggressive valve train. Premium circle track, Nano-Peened™, PAC enhanced wire.              | 961326-16 |
| 1.550                     | 1.050 | 0.726 | No     | 425 lbs @ 2.300 | 1440 @ 1.300 | 1.230     | 1.000                                  | 1015 lbs/in.      | Small diameter, low mass, high lift drag race, Nano-Peened™, Pacaloy wire.  | 961354-16 |
| 1.551                     | 1.119 | 0.709 | Yes    | 226 lbs @ 2.000 | 717 @ 1.250  | 1.150     | 0.790                                  | 652 lbs/in.       | Drag Race & Circle Track roller cams w/1.950-2.000" installed hts   | 96886-16  |

| O.D                         | I.D.1 | I.D.2 | Damper | Seat Press.     | Open Press.  | Coil Bind | Max Net Lift w / .060" clearance | Rate (lbs/in.) | Application   | Part No.  |
|-----------------------------|-------|-------|--------|-----------------|--------------|-----------|----------------------------------|----------------|---|-----------|
| <b>Dual Valve Springs</b>   |       |       |        |                 |              |           |                                  |                |   |           |
| 1.555                       | 1.130 | 0.743 | Yes    | 256 lbs @ 2.000 | 652 @ 1.250  | 1.178     | 0.762                            | 510 lbs/in.    | Professional roller cam race applications Electro-Polished  | 96884-16  |
| 1.565                       | 1.146 | 0.740 | Yes    | 190 lbs @ 1.950 | 552 @ 1.250  | 1.200     | 0.690                            | 504 lbs/in.    | Solid street rollers/Bracket racing; Hi Perf big block hyd rlr's w/tall assy hts.                     | 99876-16  |
| 1.565                       | 1.129 | 0.749 | Yes    | 215 lbs @ 1.950 | 685 @ 1.200  | 1.121     | 0.769                            | 618 lbs/in.    | Bracket Race & Circle Track Roller Cams XHTCS Spring  | 99885-16  |
| 1.593                       | 1.154 | 0.741 | Yes    | 254 lbs @ 2.050 | 687 @ 1.280  | 1.220     | 0.780                            | 576 lbs/in.    | Professional circle track endurance, ID chamfered coils, radiused damper ends, PAC enhanced wire.     | 96885-16  |
| 1.625                       | 1.175 | 0.851 | No     | 280 lbs @ 2.100 | 847 @ 2.100  | 1.100     | 0.900                            | 629 lbs/in.    | Bracket Race applications with high lift / aggressive valve train and RPM requirements, Pacaloy wire. | 961228-16 |
| 1.625                       | 1.175 | 0.769 | Yes    | 244 lbs @ 2.000 | 801 @ 1.150  | 1.090     | 0.850                            | 656 lbs/in.    | Drag Race roller cams with approx. 2.00" inst hts. XHTCS  | 99880-16  |
| 1.625                       | 1.175 | 0.769 | Yes    | 250 lbs @ 2.050 | 673 @ 1.300  | 1.210     | 0.750                            | 564 lbs/in.    | Various Big Block roller camshafts, lower lift bracket racing, PAC enhanced wire.                     | 961299-16 |
| 1.625                       | 1.175 | 0.851 | No     | 275 lbs @ 2.000 | 810 @ 1.150  | 1.100     | 0.850                            | 625 lbs/in.    | Various Big Block roller camshafts, high lift bracket racing, PAC enhanced wire.                      | 961224-16 |
| <b>Triple Valve Springs</b> |       |       |        |                 |              |           |                                  |                |   |           |
| 1.645                       | 1.195 | 0.635 | No     | 250 lbs @ 2.050 | 801 @ 1.250  | 1.130     | 0.800                            | 689 lbs/in.    | Various Big Block roller camshafts, high lift bracket racing, PAC enhanced wire.                      | 961246-16 |
| 1.645                       | 1.195 | 0.635 | No     | 290 lbs @ 2.070 | 835 @ 1.270  | 1.130     | 0.800                            | 682 lbs/in.    | Various Big Block roller camshafts, high lift bracket racing, Nano-Peened™, PAC enhanced wire.        | 961347-16 |
| 1.645                       | 1.195 | 0.635 | No     | 332 lbs @ 2.100 | 950 @ 1.200  | 1.130     | 0.900                            | 688 lbs/in.    | Various Big Block roller camshafts, high lift bracket racing, Nano-Peened™, PAC enhanced wire.        | 961348-16 |
| 1.667                       | 1.195 | 0.635 | No     | 300 lbs @ 2.100 | 963 @ 1.250  | 1.135     | 0.850                            | 780 lbs/in.    | Various Big Block roller camshafts, high lift bracket racing, PAC enhanced wire.                      | 96888-16  |
| 1.675                       | 1.203 | 0.634 | No     | 362 lbs @ 2.100 | 1035 @ 1.200 | 1.161     | 0.879                            | 684 lbs/in.    | Pro Drag Racing including blown alcohol & fuel  | 96848-16  |
| 1.675                       | 1.203 | 0.634 | No     | 352 lbs @ 2.200 | 1024 @ 1.200 | 1.161     | 0.979                            | 690 lbs/in.    | Pro Drag Racing including blown alcohol & fuel  | 96849-16  |

## More Valve Train Questions

### What is Valve Spring Coil Bind and how does it relate to Spring Travel and Valve Lift?

When the valve spring is compressed until its coils touch one another and can travel no further, it is said to be in coil bind. The catalog (pages 337 to 339) shows the approximate coil bind height for the various Crane Cams valve springs. To measure this you must install the retainer in the valve spring, then compress the spring until it coil binds. Now measure from the bottom side of the retainer to the bottom of the spring. This measurement is the coil bind height. (See Figure 1) This can be done on the cylinder head with a spring compression tool in a bench vise, or in a professional valve spring tester.

Using Figure 1, subtract the coil bind height "B" from the valve spring installed height "A". The difference "C" is the maximum spring travel. The spring travel is usually at least .060" greater than the full lift of the valve. This safety margin of .060" (or more) is necessary to avoid the dangers of coil bind and over-stressing the spring.

If coil bind occurs, the resulting mechanical interference will severely damage the camshaft and valvetrain components.

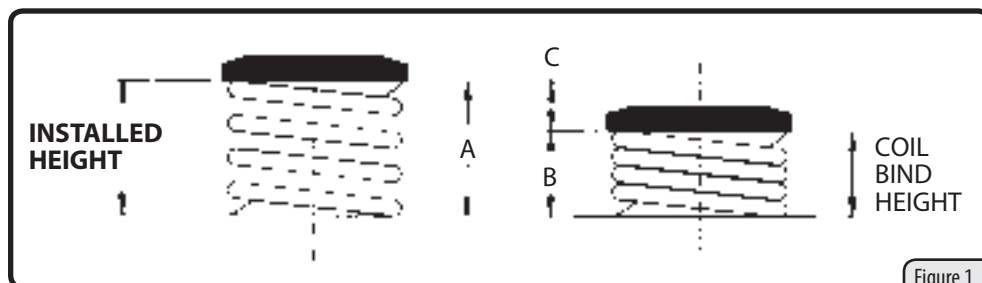


Figure 1

# Valve Springs

## Valve Spring Spec Chart

**BOLD Numbers are recommended closed pressures @ installed height.**

| Spring Type           | Single       | Single        | Single        | Single       | Single       | Single       | Single       | Single       | Single       |
|-----------------------|--------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|
| O.D.                  | 1.000        | 1.065         | 1.065         | 1.025/0.930  | 1.096/0.967  | 1.255        | 1.255        | 1.255        | 1.260        |
| I.D.                  | 0.730        | 0.725         | 0.725         | 0.662/0.567  | 0.765/0.636  | 0.870        | 0.870        | 0.870        | 0.876        |
| Damper                | No           | No            | No            | No           | No           | Yes          | No           | Yes          | Yes          |
| Installed Height      | 1.475        | 1.535         | 1.535         | 1.470        | 1.640        | 1.700        | 1.750        | 1.800        | 1.800        |
| Coil Bind             | 0.910        | 0.987         | 1.014         | 0.900        | 1.000        | 1.153        | 1.100        | 1.100        | 1.110        |
| Spring Rate (lbs/in.) | 151          | 413           | 398           | 324          | 275          | 432          | 415          | 428          | 395          |
| Max. Net. Lift        | 0.475        | 0.500         | 0.470         | 0.500        | 0.600        | 0.487        | 0.640        | 0.640        | 0.600        |
| <b>Part No.</b>       | <b>96845</b> | <b>180830</b> | <b>158830</b> | <b>40830</b> | <b>37830</b> | <b>99848</b> | <b>99845</b> | <b>99846</b> | <b>96802</b> |
| 2.300                 |              |               |               |              |              |              |              |              |              |
| 2.250                 |              |               |               |              |              |              |              |              |              |
| 2.200                 |              |               |               |              |              |              |              |              |              |
| 2.150                 |              |               |               |              |              |              |              |              |              |
| 2.100                 |              |               |               |              |              |              |              |              |              |
| 2.050                 |              |               |               |              |              |              |              |              |              |
| 2.000                 |              |               |               |              |              |              |              |              |              |
| 1.950                 |              |               |               |              |              |              |              |              |              |
| 1.900                 |              |               |               |              |              |              |              |              |              |
| 1.850                 |              |               |               |              |              |              |              | 104          |              |
| 1.800                 |              |               |               |              |              | 81           | 103          | <b>125</b>   | <b>107</b>   |
| 1.750                 |              |               |               |              |              | 100          | <b>124</b>   | 147          | 125          |
| 1.700                 |              |               |               |              | 69           | <b>114</b>   | 145          | 169          | 144          |
| 1.650                 |              |               |               |              | 82           | 137          | 165          | 190          | 162          |
| 1.600                 |              |               |               |              | 96           | 158          | 187          | 213          | 181          |
| 1.550                 |              | 54            | 79            | 64           | 110          | 179          | 208          | 235          | 199          |
| 1.500                 | 58           | 74            | 94            | 80           | 124          | 201          | 228          | 256          | 220          |
| 1.450                 | 66           | 95            | 114           | 96           | 137          | 222          | 249          | 278          | 238          |
| 1.400                 | 74           | 115           | 134           | 113          | 151          | 243          | 270          | 299          | 258          |
| 1.350                 | 81           | 136           | 154           | 129          | 165          | 265          | 290          | 321          | 280          |
| 1.300                 | 89           | 156           | 173           | 145          | 179          | 287          | 311          | 342          | 302          |
| 1.250                 | 96           | 177           | 193           | 161          | 192          | 313          | 332          | 363          | 325          |
| 1.200                 | 104          | 197           | 213           | 177          | 206          | 340          | 353          | 383          | 248          |
| 1.150                 | 111          | 218           | 233           | 194          | 220          |              | 374          | 405          |              |
| 1.100                 | 119          | 238           | 253           | 210          | 234          |              |              |              |              |
| 1.050                 | 126          | 259           |               | 226          | 247          |              |              |              |              |
| 1.000                 | 134          |               |               | 242          | 261          |              |              |              |              |
| 0.950                 | 142          |               |               | 258          |              |              |              |              |              |
| 0.900                 |              |               |               |              |              |              |              |              |              |

VALVE TRAIN

## Popular Recommended Components

|  |                 |               |               |              |              |              |              |              |              |
|--|-----------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>Steel Retainers</b><br><small>(see page 350)</small>        |                 |               |               |              |              | <b>99915</b> | <b>99914</b> | <b>99915</b> | <b>99915</b> |
|  |                 |               |               |              |              | <b>99916</b> |              | <b>99916</b> | <b>99916</b> |
| <b>Titanium Retainers 7°</b><br><small>(see page 351)</small>  | <b>905-0003</b> | <b>158660</b> | <b>158660</b> | <b>40660</b> | <b>37660</b> |              |              |              |              |
| <b>Titanium Retainers 10°</b><br><small>(see page 351)</small> |                 |               |               |              |              |              |              |              |              |
| <b>Spring Seats</b><br><small>(see page 362)</small>           |                 |               |               |              |              |              |              |              |              |

## Valve Spring Spec Chart

**BOLD Numbers are recommended closed pressures @ installed height.**

| Spring Type           | Single        | Single       | Single       | Single       | Single       | Single       | Single       |
|-----------------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|
| O.D.                  | 1.265         | 1.290/0.885  | 1.435        | 1.437        | 1.440        | 1.445/1.095  | 1.450/1.295  |
| I.D.                  | 0.865         | 1.055/0.650  | 1.035        | 1.080        | 1.040        | 1.000/0.650  | 1.014/0.859  |
| Damper                | Yes           | No           | Yes          | Yes          | No           | No           | No           |
| Installed Height      | 1.750         | 1.800        | 1.700        | 1.750        | 1.700        | 1.880        | 1.950        |
| Coil Bind             | 1.100         | 1.140        | 1.037        | 1.069        | 1.080        | 1.210        | 1.139        |
| Spring Rate (lbs/in.) | 526           | 313          | 330          | 204          | 328          | 370          | 457          |
| Max. Net. Lift        | 0.600         | 0.600        | 0.600        | 0.620        | 0.560        | 0.650        | 0.580        |
| <b>Part No.</b>       | <b>144846</b> | <b>99831</b> | <b>96803</b> | <b>96806</b> | <b>99833</b> | <b>99832</b> | <b>99841</b> |
| 2.300                 |               |              |              |              |              |              |              |
| 2.250                 |               |              |              |              |              |              |              |
| 2.200                 |               |              |              |              |              |              |              |
| 2.150                 |               |              |              |              |              |              |              |
| 2.100                 |               |              |              |              |              |              |              |
| 2.050                 |               |              |              |              |              |              |              |
| 2.000                 |               |              |              |              |              |              | 95           |
| 1.950                 |               |              |              |              |              | 129          | <b>118</b>   |
| 1.900                 |               | 99           |              |              |              | 148          | 141          |
| 1.850                 | 73            | 114          |              | 86           |              | 166          | 164          |
| 1.800                 | 99            | <b>130</b>   |              | 96           |              | 185          | 187          |
| 1.750                 | <b>125</b>    | 146          | 91           | <b>104</b>   | 83           | 203          | 209          |
| 1.700                 | 151           | 161          | <b>107</b>   | 113          | <b>98</b>    | 222          | 232          |
| 1.650                 | 177           | 177          | 123          | 122          | 113          | 240          | 255          |
| 1.600                 | 204           | 193          | 132          | 130          | 128          | 259          | 278          |
| 1.550                 | 230           | 208          | 148          | 140          | 143          | 277          | 301          |
| 1.500                 | 256           | 224          | 164          | 150          | 159          | 296          | 324          |
| 1.450                 | 282           | 240          | 181          | 160          | 174          | 314          | 347          |
| 1.400                 | 308           | 255          | 198          | 171          | 189          | 333          | 369          |
| 1.350                 | 335           | 271          | 215          | 181          | 205          | 351          | 392          |
| 1.300                 | 361           | 287          | 234          | 192          | 222          | 370          | 415          |
| 1.250                 | 388           | 302          | 251          | 203          | 239          | 388          | 438          |
| 1.200                 | 413           | 318          | 272          | 215          | 256          |              | 461          |
| 1.150                 | 439           |              | 289          | 229          | 274          |              |              |
| 1.100                 |               |              | 317          | 240          | 293          |              |              |
| 1.050                 |               |              |              |              |              |              |              |
| 1.000                 |               |              |              |              |              |              |              |
| 0.950                 |               |              |              |              |              |              |              |
| 0.900                 |               |              |              |              |              |              |              |

## Popular Recommended Components

|  |                              |              |                              |                              |                              |              |              |
|--|------------------------------|--------------|------------------------------|------------------------------|------------------------------|--------------|--------------|
| <b>Steel Retainers</b><br><small>(see page 350)</small>        | <b>99915</b><br><b>99916</b> | <b>99976</b> | <b>99946</b><br><b>99969</b> | <b>99936</b><br><b>99944</b> | <b>99936</b><br><b>99944</b> | <b>99976</b> | <b>99942</b> |
| <b>Titanium Retainers 7°</b><br><small>(see page 351)</small>  |                              | <b>99637</b> |                              |                              |                              | <b>99637</b> |              |
| <b>Titanium Retainers 10°</b><br><small>(see page 351)</small> |                              |              |                              |                              | <b>99630</b>                 |              |              |
| <b>Spring Seats</b><br><small>(see page 362)</small>           |                              |              |                              |                              |                              |              |              |

# Valve Springs

## Valve Spring Spec Chart

**BOLD Numbers are recommended closed pressures @ installed height.**

| Spring Type           | Single       | Single       | Single       | Single       | Single       | Single        | Single        | Single        |
|-----------------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| O.D.                  | 1.460        | 1.460        | 1.500        | 1.500        | 1.539        | 0.937         | 0.953         | 0.970         |
| I.D.                  | 1.060        | 1.060        | 1.086        | 1.086        | 1.125        | 0.697         | 0.697         | 0.700         |
| Damper                | Yes          | Yes          | Yes          | Yes          | Yes          | No            | No            | No            |
| Installed Height      | 1.550        | 1.800        | 1.600        | 1.800        | 1.950        | 1.600         | 1.500         | 1.750         |
| Coil Bind             | 0.935        | 1.139        | 1.000        | 1.130        | 1.130        | 0.925         | 0.916         | 1.014         |
| Spring Rate (lbs/in.) | 442          | 310          | 412          | 354          | 312          | 96            | 132           | 135           |
| Max. Net. Lift        | 0.605        | 0.600        | 0.565        | 0.660        | 0.700        | 0.615         | 0.500         | 0.676         |
| <b>Part No.</b>       | <b>99840</b> | <b>96801</b> | <b>99835</b> | <b>99839</b> | <b>96807</b> | <b>*96842</b> | <b>*96843</b> | <b>*96840</b> |
| 2.300                 |              |              |              |              |              |               |               |               |
| 2.250                 |              |              |              |              |              |               |               |               |
| 2.200                 |              |              |              |              |              |               |               |               |
| 2.150                 |              |              |              |              |              |               |               |               |
| 2.100                 |              |              |              |              |              |               |               |               |
| 2.050                 |              |              |              |              |              |               |               |               |
| 2.000                 |              |              |              |              | 115          |               |               |               |
| 1.950                 |              | 75           |              |              | <b>129</b>   |               |               |               |
| 1.900                 |              | 88           |              | 86           | 136          |               |               |               |
| 1.850                 |              | 101          |              | 102          | 149          |               |               | 38            |
| 1.800                 |              | <b>114</b>   |              | <b>121</b>   | 162          |               |               | 45            |
| 1.750                 |              | 128          |              | 138          | 177          | 14            |               | <b>51</b>     |
| 1.700                 |              | 143          |              | 155          | 192          | 19            |               | 58            |
| 1.650                 |              | 157          | 92           | 172          | 207          | 23            |               | 63            |
| 1.600                 | 91           | 171          | <b>113</b>   | 189          | 222          | <b>29</b>     | 42            | 70            |
| 1.550                 | <b>110</b>   | 186          | 133          | 206          | 237          | 32            | 48            | 76            |
| 1.500                 | 131          | 201          | 154          | 224          | 252          | 37            | <b>54</b>     | 83            |
| 1.450                 | 151          | 218          | 174          | 242          | 269          | 42            | 60            | 90            |
| 1.400                 | 171          | 235          | 195          | 260          | 286          | 47            | 66            | 97            |
| 1.350                 | 191          | 252          | 215          | 279          | 302          | 51            | 73            | 105           |
| 1.300                 | 212          | 269          | 234          | 298          | 318          | 56            | 80            | 112           |
| 1.250                 | 233          | 287          | 256          | 320          | 338          | 61            | 87            | 120           |
| 1.200                 | 255          | 304          | 277          | 338          | 358          | 66            | 94            | 127           |
| 1.150                 | 279          |              | 298          | 359          |              | 71            | 102           | 134           |
| 1.100                 | 303          |              | 319          |              |              | 76            | 111           |               |
| 1.050                 | 328          |              | 342          |              |              | 82            | 120           |               |
| 1.000                 | 352          |              | 364          |              |              | 90            | 130           |               |
| 0.950                 | 378          |              |              |              |              |               |               |               |
| 0.900                 |              |              |              |              |              |               |               |               |

VALVE TRAIN

## Popular Recommended Components

|  |                              |                              |                              |                              |                              |
|--|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| <b>Steel Retainers</b><br><small>(see page 350)</small>        | <b>99936</b><br><b>99944</b> | <b>99936</b><br><b>99944</b> | <b>99936</b><br><b>99944</b> | <b>99936</b><br><b>99944</b> | <b>99962</b><br><b>99970</b> |
| <b>Titanium Retainers 7°</b><br><small>(see page 351)</small>  |                              |                              |                              |                              |                              |
| <b>Titanium Retainers 10°</b><br><small>(see page 351)</small> | <b>99630</b>                 |                              | <b>99630</b>                 | <b>99630</b>                 | <b>99641</b>                 |
| <b>Spring Seats</b><br><small>(see page 362)</small>           | <b>99457</b>                 |                              | <b>99459</b>                 | <b>99459</b>                 |                              |

\* Denotes Inner Spring



## Valve Spring Spec Chart

**BOLD Numbers are recommended closed pressures @ installed height.**

| Spring Type           | Single        | Dual         | Dual         | Dual          | Dual          | Dual         | Dual         | Dual         |
|-----------------------|---------------|--------------|--------------|---------------|---------------|--------------|--------------|--------------|
| O.D.                  | 1.015         | 1.212        | 1.218        | 1.298         | 1.298         | 1.304        | 1.344        | 1.437        |
| I.D.                  | 0.731         | 0.674        | 0.680        | 0.667         | 0.664         | 0.754        | 0.730        | 0.697        |
| Damper                | No            | No           | No           | No            | No            | No           | No           | Yes          |
| Installed Height      | 1.800         | 1.550        | 1.300        | 1.800         | 1.800         | 1.650        | 1.800        | 1.750        |
| Coil Bind             | 1.045         | 0.865        | 0.783        | 1.060         | 1.080         | 0.927        | 1.057        | 1.185        |
| Spring Rate (lbs/in.) | 155           | 290          | 337          | 408           | 477           | 215          | 334          | 296          |
| Max. Net. Lift        | 0.650         | 0.625        | 0.457        | 0.680         | 0.660         | 0.663        | 0.710        | 0.600        |
| <b>Part No.</b>       | <b>*96844</b> | <b>99891</b> | <b>99879</b> | <b>144838</b> | <b>144847</b> | <b>99884</b> | <b>96887</b> | <b>96873</b> |
| 2.300                 |               |              |              |               |               |              |              |              |
| 2.250                 |               |              |              |               |               |              |              |              |
| 2.200                 |               |              |              |               |               |              |              |              |
| 2.150                 |               |              |              |               |               |              |              |              |
| 2.100                 |               |              |              |               |               |              |              |              |
| 2.050                 |               |              |              |               |               |              |              |              |
| 2.000                 |               |              |              |               |               |              |              |              |
| 1.950                 | 33            |              |              |               |               |              |              |              |
| 1.900                 | 41            |              |              | 107           | 103           |              |              |              |
| 1.850                 | 49            |              |              | 128           | 127           |              |              | 106          |
| 1.800                 | <b>57</b>     |              |              | <b>148</b>    | <b>151</b>    |              | <b>114</b>   | 120          |
| 1.750                 | 64            |              |              | 168           | 175           | 76           | 129          | <b>134</b>   |
| 1.700                 | 72            |              |              | 189           | 199           | 86           | 144          | 148          |
| 1.650                 | 80            | <b>66</b>    |              | 209           | 223           | <b>96</b>    | 160          | 162          |
| 1.600                 | 88            | 79           |              | 230           | 246           | 107          | 176          | 175          |
| 1.550                 | 95            | 93           |              | 250           | 270           | 118          | 192          | 189          |
| 1.500                 | 103           | 107          |              | 270           | 294           | 128          | 208          | 204          |
| 1.450                 | 111           | 121          |              | 291           | 318           | 139          | 224          | 219          |
| 1.400                 | 119           | 135          |              | 311           | 342           | 150          | 240          | 234          |
| 1.350                 | 126           | 148          | 76           | 332           | 366           | 161          | 257          | 250          |
| 1.300                 | 134           | 162          | <b>91</b>    | 352           | 390           | 172          | 274          | 267          |
| 1.250                 | 143           | 176          | 106          | 372           | 413           | 184          | 292          | 283          |
| 1.200                 | 151           | 190          | 122          | 393           | 437           | 195          | 310          | 299          |
| 1.150                 | 160           | 204          | 137          | 413           | 461           | 206          | 330          |              |
| 1.100                 |               | 219          | 152          |               |               | 218          | 350          |              |
| 1.050                 |               | 234          | 168          |               |               | 230          |              |              |
| 1.000                 |               | 250          | 184          |               |               |              |              |              |
| 0.950                 |               | 266          | 202          |               |               |              |              |              |
| 0.900                 |               | 284          | 220          |               |               |              |              |              |

## Popular Recommended Components

|  |                              |              |               |               |              |              |                              |
|--|------------------------------|--------------|---------------|---------------|--------------|--------------|------------------------------|
| <b>Steel Retainers</b><br><small>(see page 350)</small>        | <b>99912</b><br><b>99916</b> | <b>99926</b> | <b>144944</b> | <b>144944</b> | <b>99967</b> | <b>99935</b> | <b>99944</b><br><b>99969</b> |
| <b>Titanium Retainers 7°</b><br><small>(see page 351)</small>  |                              |              | <b>99975</b>  | <b>99975</b>  |              |              | <b>99669</b>                 |
| <b>Titanium Retainers 10°</b><br><small>(see page 351)</small> |                              |              | <b>144661</b> | <b>144661</b> |              |              | <b>99630</b>                 |
| <b>Spring Seats</b><br><small>(see page 362)</small>           |                              |              | <b>99657</b>  | <b>99657</b>  |              |              | <b>99465</b>                 |

\* Denotes Inner Spring

# Valve Springs

## Valve Spring Spec Chart

**BOLD Numbers are recommended closed pressures @ installed height.**

| Spring Type           | Dual         | Dual         | Dual         | Dual         | Dual         | Dual         | Dual         | Dual          |
|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| O.D.                  | 1.437        | 1.437        | 1.449        | 1.460        | 1.460        | 1.460        | 1.465        | 1.500         |
| I.D.                  | 0.697        | 0.700        | 0.794        | 0.697        | 0.803        | 0.700        | 0.807        | 0.726         |
| Damper                | Yes          | Yes          | No           | Yes          | No           | Yes          | No           | No            |
| Installed Height      | 1.800        | 1.850        | 1.875        | 1.850        | 1.850        | 1.900        | 1.650        | 2.100         |
| Coil Bind             | 1.115        | 1.110        | 1.035        | 1.175        | 1.080        | 1.154        | 0.950        | 1.130         |
| Spring Rate (lbs/in.) | 322          | 326          | 392          | 404          | 391          | 448          | 438          | 780           |
| Max. Net. Lift        | 0.625        | 0.680        | 0.625        | 0.615        | 0.710        | 0.686        | 0.690        | 0.900         |
| <b>Part No.</b>       | <b>96874</b> | <b>96872</b> | <b>99892</b> | <b>96877</b> | <b>99893</b> | <b>96870</b> | <b>99838</b> | <b>961356</b> |
| 2.300                 |              |              |              |              |              |              |              |               |
| 2.250                 |              |              |              |              |              |              |              |               |
| 2.200                 |              |              |              |              |              |              |              | 222           |
| 2.150                 |              |              |              |              |              |              |              | 261           |
| 2.100                 |              |              |              |              |              |              |              | <b>300</b>    |
| 2.050                 |              |              |              |              |              |              |              | 339           |
| 2.000                 |              |              |              |              |              |              |              | 378           |
| 1.950                 |              |              |              | 88           | 92           | 113          |              | 417           |
| 1.900                 |              | 115          | 110          | 107          | 112          | <b>134</b>   |              | 456           |
| 1.850                 | 112          | <b>131</b>   | 130          | <b>126</b>   | <b>130</b>   | 154          |              | 495           |
| 1.800                 | <b>128</b>   | 146          | 149          | 144          | 149          | 174          |              | 534           |
| 1.750                 | 142          | 160          | 169          | 163          | 167          | 194          |              | 573           |
| 1.700                 | 156          | 175          | 189          | 183          | 186          | 215          | 91           | 612           |
| 1.650                 | 171          | 189          | 208          | 203          | 205          | 236          | <b>112</b>   | 651           |
| 1.600                 | 186          | 205          | 228          | 222          | 223          | 256          | 131          | 690           |
| 1.550                 | 202          | 221          | 247          | 242          | 242          | 278          | 151          | 729           |
| 1.500                 | 218          | 238          | 267          | 261          | 261          | 300          | 171          | 768           |
| 1.450                 | 234          | 255          | 287          | 282          | 279          | 323          | 190          | 807           |
| 1.400                 | 252          | 272          | 306          | 304          | 298          | 348          | 210          | 846           |
| 1.350                 | 270          | 291          | 326          | 324          | 318          | 373          | 230          | 885           |
| 1.300                 | 289          | 309          | 345          | 346          | 338          | 398          | 251          | 924           |
| 1.250                 | 308          | 327          | 365          | 366          | 358          | 424          | 271          | 963           |
| 1.200                 | 328          | 345          | 385          | 389          | 380          | 447          | 292          | 1002          |
| 1.150                 | 352          | 368          | 404          |              | 402          |              | 313          | 1041          |
| 1.100                 |              |              | 424          |              |              |              | 336          |               |
| 1.050                 |              |              |              |              |              |              | 360          |               |
| 1.000                 |              |              |              |              |              |              | 383          |               |
| 0.950                 |              |              |              |              |              |              |              |               |
| 0.900                 |              |              |              |              |              |              |              |               |

VALVE TRAIN

## Popular Recommended Components

|  |                              |                              |                              |                              |                              |                              |                              |                              |
|--|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| <b>Steel Retainers</b><br><small>(see page 350)</small>        | <b>99944</b><br><b>99969</b> | <b>99944</b><br><b>99969</b> | <b>99953</b><br><b>99954</b> | <b>99944</b><br><b>99969</b> | <b>99953</b><br><b>99954</b> | <b>99944</b><br><b>99969</b> | <b>99944</b><br><b>99969</b> | <b>99970</b><br><b>99974</b> |
| <b>Titanium Retainers 7°</b><br><small>(see page 351)</small>  | <b>99669</b>                 | <b>99669</b>                 | <b>99639</b>                 | <b>99669</b>                 | <b>99669</b>                 | <b>99669</b>                 | <b>99669</b>                 | <b>99663</b>                 |
| <b>Titanium Retainers 10°</b><br><small>(see page 351)</small> | <b>99630</b>                 | <b>99630</b>                 |                              | <b>99630</b>                 | <b>99630</b>                 | <b>99630</b>                 | <b>99630</b>                 | <b>99640</b>                 |
| <b>Spring Seats</b><br><small>(see page 362)</small>           | <b>99465</b>                 | <b>99465</b>                 |                              | <b>99465</b>                 |                              | <b>99465</b>                 |                              | <b>99465</b><br><b>99455</b> |

## Valve Spring Spec Chart

**BOLD Numbers are recommended closed pressures @ installed height.**

| Spring Type           | Dual          | Dual          | Dual         | Dual         | Dual         | Dual         | Dual         | Dual         | Dual          |
|-----------------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| O.D.                  | 1.500         | 1.522         | 1.530        | 1.539        | 1.539        | 1.540        | 1.540        | 1.540        | 1.550         |
| I.D.                  | 0.726         | 0.726         | 0.776        | 0.697        | 0.697        | 0.754        | 0.760        | 0.729        | 0.706         |
| Damper                | No            | No            | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes           |
| Installed Height      | 2.175         | 2.250         | 1.900        | 1.900        | 1.900        | 1.900        | 1.900        | 1.950        | 2.000         |
| Coil Bind             | 1.130         | 1.190         | 1.160        | 1.145        | 1.152        | 1.175        | 1.085        | 1.130        | 1.150         |
| Spring Rate (lbs/in.) | 780           | 895           | 428          | 444          | 480          | 434          | 528          | 544          | 663           |
| Max. Net. Lift        | 1.000         | 0.950         | 0.630        | 0.700        | 0.680        | 0.665        | 0.755        | 0.760        | 0.800         |
| <b>Part No.</b>       | <b>961355</b> | <b>961360</b> | <b>99890</b> | <b>96879</b> | <b>96878</b> | <b>99895</b> | <b>99896</b> | <b>96883</b> | <b>961226</b> |
| 2.300                 |               | 357           |              |              |              |              |              |              |               |
| 2.250                 | 361           | <b>402</b>    |              |              |              |              |              |              |               |
| 2.200                 | <b>400</b>    | 447           |              |              |              |              |              |              |               |
| 2.150                 | 439           | 491           |              |              |              |              |              |              |               |
| 2.100                 | 478           | 536           |              |              |              |              |              | 148          | 209           |
| 2.050                 | 517           | 581           |              |              |              |              |              | 174          | 242           |
| 2.000                 | 556           | 626           |              | 116          | 154          |              | 110          | 200          | <b>275</b>    |
| 1.950                 | 595           | 670           | 112          | 137          | 178          | 123          | 128          | <b>224</b>   | 308           |
| 1.900                 | 634           | 715           | <b>131</b>   | <b>160</b>   | <b>200</b>   | <b>144</b>   | <b>150</b>   | 250          | 341           |
| 1.850                 | 673           | 760           | 151          | 180          | 222          | 165          | 173          | 275          | 374           |
| 1.800                 | 712           | 805           | 171          | 202          | 244          | 186          | 196          | 300          | 407           |
| 1.750                 | 751           | 849           | 190          | 223          | 266          | 207          | 220          | 327          | 441           |
| 1.700                 | 790           | 894           | 210          | 244          | 288          | 228          | 244          | 352          | 474           |
| 1.650                 | 829           | 939           | 229          | 266          | 311          | 250          | 267          | 379          | 507           |
| 1.600                 | 868           | 984           | 250          | 286          | 335          | 272          | 290          | 404          | 540           |
| 1.550                 | 907           | 1028          | 271          | 307          | 354          | 292          | 316          | 432          | 573           |
| 1.500                 | 946           | 1073          | 292          | 328          | 383          | 312          | 343          | 458          | 606           |
| 1.450                 | 985           | 1118          | 313          | 350          | 409          | 334          | 372          | 484          | 639           |
| 1.400                 | 1025          | 1163          | 336          | 375          | 436          | 357          | 399          | 512          | 672           |
| 1.350                 | 1064          | 1207          | 360          | 401          | 460          | 380          | 428          | 541          | 706           |
| 1.300                 | 1103          | 1252          | 385          | 424          | 484          | 403          | 460          | 572          | 739           |
| 1.250                 | 1142          | 1297          | 410          | 448          | 508          | 430          | 491          | 604          | 772           |
| 1.200                 | 1181          | 1342          | 435          | 471          | 532          | 457          | 524          | 638          | 805           |
| 1.150                 | 1220          |               |              |              |              |              | 560          |              | 838           |
| 1.100                 |               |               |              |              |              |              |              |              |               |
| 1.050                 |               |               |              |              |              |              |              |              |               |
| 1.000                 |               |               |              |              |              |              |              |              |               |
| 0.950                 |               |               |              |              |              |              |              |              |               |
| 0.900                 |               |               |              |              |              |              |              |              |               |

## Popular Recommended Components

|  |                              |                              |                              |              |                              |                              |                              |                              |                              |
|--|------------------------------|------------------------------|------------------------------|--------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| <b>Steel Retainers</b><br><small>(see page 350)</small>        | <b>99970</b><br><b>99974</b> | <b>99970</b><br><b>99974</b> | <b>99962</b><br><b>99970</b> | <b>99926</b> | <b>99970</b><br><b>99974</b> | <b>99956</b><br><b>99970</b> | <b>99956</b><br><b>99970</b> | <b>99970</b><br><b>99974</b> | <b>99970</b><br><b>99974</b> |
| <b>Titanium Retainers 7°</b><br><small>(see page 351)</small>  | <b>99663</b>                 | <b>99663</b>                 | <b>99659</b>                 |              | <b>99659</b>                 | <b>99678</b><br><b>99681</b> | <b>99678</b><br><b>99681</b> | <b>99678</b><br><b>99681</b> |                              |
| <b>Titanium Retainers 10°</b><br><small>(see page 351)</small> | <b>99640</b>                 | <b>99640</b>                 | <b>99641</b>                 | <b>99641</b> | <b>99634</b><br><b>99641</b> | <b>99631</b><br><b>99632</b> | <b>99631</b><br><b>99632</b> |                              | <b>99631</b><br><b>99639</b> |
| <b>Spring Seats</b><br><small>(see page 362)</small>           | <b>99465</b><br><b>99455</b> | <b>99465</b><br><b>99455</b> | <b>99466</b>                 |              | <b>99460</b>                 | <b>99464</b>                 | <b>99466</b><br><b>99464</b> | <b>99460</b>                 | <b>99465</b>                 |

# Valve Springs

## Valve Spring Spec Chart

**BOLD Numbers are recommended closed pressures @ installed height.**

| Spring Type           | Dual          | Dual          | Dual          | Dual         | Dual         | Dual         | Dual         | Dual          | Dual         |
|-----------------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|---------------|--------------|
| O.D.                  | 1.550         | 1.550         | 1.550         | 1.551        | 1.555        | 1.565        | 1.565        | 1.625         | 1.593        |
| I.D.                  | 0.788         | 0.706         | 0.726         | 0.709        | 0.743        | 0.740        | 0.749        | 0.851         | 0.741        |
| Damper                | No            | Yes           | No            | Yes          | Yes          | Yes          | Yes          | No            | Yes          |
| Installed Height      | 2.000         | 2.000         | 2.300         | 2.000        | 2.000        | 1.950        | 1.950        | 2.100         | 2.050        |
| Coil Bind             | 1.150         | 1.150         | 1.230         | 1.150        | 1.178        | 1.200        | 1.121        | 1.100         | 1.220        |
| Spring Rate (lbs/in.) | 644           | 662           | 1015          | 652          | 510          | 504          | 618          | 629           | 576          |
| Max. Net. Lift        | 0.800         | 0.800         | 1.000         | 0.790        | 0.762        | 0.690        | 0.769        | 0.900         | 0.770        |
| <b>Part No.</b>       | <b>961325</b> | <b>961326</b> | <b>961354</b> | <b>96886</b> | <b>96884</b> | <b>99876</b> | <b>99885</b> | <b>961228</b> | <b>96885</b> |
| 2.300                 |               |               | <b>425</b>    |              |              |              |              |               |              |
| 2.250                 |               |               | 476           |              |              |              |              |               |              |
| 2.200                 |               |               | 526           |              |              |              | 217          |               |              |
| 2.150                 |               |               | 577           |              |              |              | 249          |               |              |
| 2.100                 | 186           | 209           | 628           | 167          | 207          |              | <b>280</b>   | 227           |              |
| 2.050                 | 218           | 242           | 679           | 197          | 232          |              | 161          | 311           | <b>254</b>   |
| 2.000                 | <b>250</b>    | <b>275</b>    | 729           | <b>226</b>   | <b>256</b>   | 163          | 189          | 343           | 280          |
| 1.950                 | 282           | 308           | 780           | 255          | 280          | <b>190</b>   | <b>215</b>   | 374           | 305          |
| 1.900                 | 314           | 341           | 831           | 284          | 308          | 214          | 242          | 406           | 330          |
| 1.850                 | 347           | 374           | 882           | 314          | 332          | 239          | 270          | 437           | 356          |
| 1.800                 | 379           | 407           | 932           | 344          | 357          | 264          | 297          | 469           | 383          |
| 1.750                 | 411           | 441           | 983           | 374          | 381          | 290          | 324          | 500           | 411          |
| 1.700                 | 443           | 474           | 1034          | 406          | 407          | 314          | 352          | 532           | 440          |
| 1.650                 | 475           | 507           | 1085          | 439          | 431          | 339          | 381          | 563           | 468          |
| 1.600                 | 507           | 540           | 1136          | 473          | 458          | 364          | 411          | 595           | 496          |
| 1.550                 | 540           | 573           | 1186          | 507          | 482          | 390          | 444          | 626           | 526          |
| 1.500                 | 572           | 606           | 1237          | 541          | 508          | 415          | 475          | 658           | 556          |
| 1.450                 | 604           | 639           | 1288          | 574          | 533          | 441          | 505          | 689           | 587          |
| 1.400                 | 636           | 672           | 1339          | 610          | 560          | 466          | 536          | 721           | 618          |
| 1.350                 | 668           | 706           | 1389          | 643          | 585          | 493          | 572          | 752           | 647          |
| 1.300                 | 701           | 739           | 1440          | 683          | 612          | 522          | 606          | 784           | 676          |
| 1.250                 | 733           | 772           | 1491          | 717          | 652          | 552          | 645          | 815           |              |
| 1.200                 | 765           | 805           |               |              | 692          |              | 685          | 846           |              |
| 1.150                 |               |               |               |              |              |              |              | 878           |              |
| 1.100                 |               |               |               |              |              |              |              |               |              |
| 1.050                 |               |               |               |              |              |              |              |               |              |
| 1.000                 |               |               |               |              |              |              |              |               |              |
| 0.950                 |               |               |               |              |              |              |              |               |              |
| 0.900                 |               |               |               |              |              |              |              |               |              |

VALVE TRAIN

## Popular Recommended Components

|  |                              |                              |                              |  |                              |                              |                              |                              |
|--|------------------------------|------------------------------|------------------------------|--|------------------------------|------------------------------|------------------------------|------------------------------|
| <b>Steel Retainers</b><br><small>(see page 350)</small>        | <b>99970</b><br><b>99974</b> | <b>99970</b><br><b>99974</b> | <b>99970</b><br><b>99974</b> | <b>99974</b><br><b>99970</b><br><b>99974</b> | <b>99956</b><br><b>99970</b> | <b>99956</b><br><b>99970</b> | <b>99956</b><br><b>99970</b> | <b>99970</b><br><b>99974</b> |
| <b>Titanium Retainers 7°</b><br><small>(see page 351)</small>  | <b>99661</b>                 | <b>99661</b>                 | <b>99663</b>                 | <b>99659</b>                                 | <b>99675</b><br><b>99681</b> | <b>99678</b><br><b>99681</b> | <b>99678</b><br><b>99681</b> | <b>99660</b><br><b>99675</b> |
| <b>Titanium Retainers 10°</b><br><small>(see page 351)</small> | <b>99639</b><br><b>99641</b> | <b>99639</b><br><b>99641</b> | <b>99640</b>                 | <b>99634</b><br><b>99641</b>                 | <b>99631</b><br><b>99632</b> | <b>99631</b><br><b>99632</b> | <b>99634</b><br><b>99641</b> | <b>99638</b><br><b>99632</b> |
| <b>Spring Seats</b><br><small>(see page 362)</small>           | <b>99464</b>                 | <b>99465</b><br><b>99464</b> | <b>99465</b><br><b>99455</b> | <b>99465</b>                                 | <b>99460</b>                 | <b>99460</b><br><b>99464</b> | <b>99460</b><br><b>99464</b> | <b>99463</b><br><b>99460</b> |

# Valve Springs



## Valve Spring Spec Chart

**BOLD Numbers are recommended closed pressures @ installed height.**

| Spring Type           | Dual         | Dual          | Dual          | Triple        | Triple        | Triple        | Triple       | Triple       | Triple       |
|-----------------------|--------------|---------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|
| O.D.                  | 1.625        | 1.625         | 1.625         | 1.645         | 1.645         | 1.645         | 1.667        | 1.675        | 1.675        |
| I.D.                  | 0.769        | 0.769         | 0.851         | 0.635         | 0.635         | 0.635         | 0.635        | 0.634        | 0.634        |
| Damper                | Yes          | Yes           | No            | No            | No            | No            | No           | No           | No           |
| Installed Height      | 2.000        | 2.050         | 2.000         | 2.050         | 2.070         | 2.100         | 2.100        | 2.100        | 2.200        |
| Coil Bind             | 1.090        | 1.210         | 1.100         | 1.130         | 1.130         | 1.135         | 1.135        | 1.161        | 1.161        |
| Spring Rate (lbs/in.) | 656          | 564           | 625           | 689           | 682           | 688           | 780          | 684          | 690          |
| Max. Net. Lift        | 0.850        | 0.750         | 0.850         | 0.800         | 0.800         | 0.900         | 0.850        | 0.879        | 0.979        |
| <b>Part No.</b>       | <b>99880</b> | <b>961299</b> | <b>961224</b> | <b>961246</b> | <b>961347</b> | <b>961348</b> | <b>96888</b> | <b>96848</b> | <b>96849</b> |
| 2.300                 |              |               |               |               |               |               |              | 230          | 289          |
| 2.250                 |              |               |               |               |               |               |              | 262          | 320          |
| 2.200                 |              |               |               |               |               | 263           |              | 295          | <b>352</b>   |
| 2.150                 |              | 194           |               |               | 236           | 298           | 261          | 329          | 385          |
| 2.100                 | 182          | 222           | 212           | 216           | 270           | <b>332</b>    | <b>300</b>   | <b>362</b>   | 418          |
| 2.050                 | 213          | <b>250</b>    | 244           | <b>250</b>    | 304           | 366           | 339          | 396          | 452          |
| 2.000                 | <b>244</b>   | 278           | <b>275</b>    | 284           | 338           | 401           | 378          | 430          | 487          |
| 1.950                 | 275          | 306           | 306           | 319           | 372           | 435           | 417          | 462          | 520          |
| 1.900                 | 306          | 335           | 338           | 353           | 406           | 469           | 456          | 498          | 554          |
| 1.850                 | 337          | 363           | 369           | 388           | 440           | 504           | 495          | 530          | 588          |
| 1.800                 | 368          | 391           | 401           | 422           | 474           | 538           | 534          | 564          | 623          |
| 1.750                 | 400          | 419           | 432           | 457           | 508           | 572           | 573          | 598          | 657          |
| 1.700                 | 431          | 447           | 464           | 491           | 542           | 607           | 612          | 633          | 692          |
| 1.650                 | 463          | 476           | 495           | 526           | 576           | 641           | 651          | 668          | 727          |
| 1.600                 | 496          | 504           | 527           | 560           | 610           | 675           | 690          | 704          | 761          |
| 1.550                 | 528          | 532           | 558           | 594           | 644           | 710           | 729          | 740          | 797          |
| 1.500                 | 560          | 560           | 590           | 629           | 678           | 744           | 768          | 776          | 832          |
| 1.450                 | 594          | 588           | 621           | 663           | 712           | 778           | 807          | 815          | 870          |
| 1.400                 | 627          | 617           | 653           | 698           | 746           | 813           | 846          | 857          | 906          |
| 1.350                 | 663          | 645           | 684           | 732           | 781           | 847           | 885          | 900          | 942          |
| 1.300                 | 696          | 673           | 716           | 767           | 815           | 881           | 924          | 942          | 981          |
| 1.250                 | 731          | 701           | 747           | 801           | 849           | 916           | 963          | 987          | 1024         |
| 1.200                 | 764          |               | 779           | 835           | 883           | 950           | 1002         | 1035         |              |
| 1.150                 | 801          |               | 810           |               |               | 984           |              |              |              |
| 1.100                 |              |               |               |               |               |               |              |              |              |
| 1.050                 |              |               |               |               |               |               |              |              |              |
| 1.000                 |              |               |               |               |               |               |              |              |              |
| 0.950                 |              |               |               |               |               |               |              |              |              |
| 0.900                 |              |               |               |               |               |               |              |              |              |

## Popular Recommended Components

|  |                              |                              |              |              |              |              |                              |                              |                              |
|--|------------------------------|------------------------------|--------------|--------------|--------------|--------------|------------------------------|------------------------------|------------------------------|
| <b>Steel Retainers</b><br><small>(see page 350)</small>        | <b>99962</b>                 |                              |              |              |              |              |                              |                              |                              |
| <b>Titanium Retainers 7°</b><br><small>(see page 351)</small>  | <b>99675</b>                 | <b>99660</b>                 | <b>99660</b> | <b>99662</b> | <b>99662</b> | <b>99662</b> | <b>99678</b><br><b>99681</b> | <b>99678</b><br><b>99681</b> | <b>99678</b><br><b>99681</b> |
| <b>Titanium Retainers 10°</b><br><small>(see page 351)</small> | <b>99633</b>                 | <b>99638</b>                 | <b>99638</b> | <b>99632</b> |              |              | <b>99632</b><br><b>99636</b> | <b>99632</b><br><b>99636</b> | <b>99632</b><br><b>99636</b> |
| <b>Spring Seats</b><br><small>(see page 362)</small>           | <b>99466</b><br><b>99463</b> | <b>99466</b><br><b>99463</b> | <b>99463</b> | <b>99461</b> | <b>99461</b> | <b>99461</b> |                              |                              |                              |

\* Denotes Inner Spring

# Valve Spring Retainers

## Steel Valve Spring Retainers

### STANDARD CONFIGURATION

Crane Cams' steel valve spring retainers are precision manufactured from high quality bar stock steel, heat treated for maximum strength and durability, and black oxidized for corrosion resistance. Crane steel retainers are made for 8mm, 5/16", 11/32", and 3/8" valve stem diameters with 7° taper and are compatible with either Crane stamped steel or machined steel valve stem locks. Retainers for 3/8" diameter valve stems will also accommodate Crane Multi Fit steel locks (All locks sold separately. See pages 360-361). We additionally offer retainers designed for specific engine applications.



### MULTI FIT STYLE STEEL RETAINERS WITH 7° TAPER

The Multi Fit style has the same basic tapered I.D. dimensions as a normal 7° steel retainer made for a 3/8" valve stem diameter, and are manufactured from premium quality bar stock material. By using the special thick Multi Fit Valve Stem Locks, these retainers can be used with either 5/16" or 11/32" valve stem diameters. By using Crane Cams' 3/8" machined steel valve locks, these same retainers will accommodate a 3/8" valve stem also. Locks are sold separately, see pages 360-361.

### MULTI FIT STYLE STEEL RETAINERS WITH 10° TAPER

Our Multi Fit 10 degree retainers and locks differ from the conventional 10 degree items, as we use a smaller outside diameter lock, enabling the retainer to have a greater cross section in the critical area separating the inner spring steps from the tapered center hole. This provides superior strength and stability when compared to the competition, and these retainers are designed for use **only** with our Multi Fit locks. Compatible locks are offered for 8mm, 5/16", 11/32" and 3/8" valve stems in standard square groove and bead groove configurations. Optional assembly height locks are also offered, see pages 360-361.

## Titanium Valve Spring Retainers

The lighter your valve train components, the quicker the engine will rev. Titanium retainers are **40% lighter** than steel. All Crane titanium retainers are machined from certified American-made bar stock. Beware of the recent influx of inexpensive "titanium" retainers. These are probably made of **inferior imported material**, and **will not** pass certification standards.

### MULTI FIT STYLE TITANIUM RETAINERS WITH 7° TAPER

The Multi Fit style has the same basic tapered I.D. dimensions as a normal 7° steel retainer made for a 3/8" valve stem diameter, and are manufactured from premium quality bar stock material. By using the special thick Multi Fit Valve Stem Locks, these retainers can be used with either 5/16" or 11/32" valve stem diameters. By using Crane Cams' 3/8" machined steel valve locks, these same retainers will accommodate a 3/8" valve stem also. Locks are sold separately, see pages 360-361.



### POSI-STOP™ DESIGN TITANIUM RETAINERS WITH 7° TAPER

**Absolutely The Strongest Titanium Retainer/Lock System Available! Proven In Competition By Nationally-Known Pro Stock, Top Fuel, Funny Car, And Short-Track Race Teams!**

Crane Cams' Posi-Stop titanium retainers feature the patented stepped design that reinforces the bottom of the retainer. This both **significantly increases the integral strength of the retainer**, and **eliminates** the valve lock's ability to **pull through** the bottom of the retainer. "Posi-Stop" retainers are made for 5/16", 11/32", or 3/8" valve stem diameters with 7° taper, and come with matching Crane machined valve stem locks.



### MULTI FIT STYLE TITANIUM RETAINERS WITH 10° TAPER

Our Multi Fit 10 degree retainers and locks differ from the conventional 10 degree items, as we use a smaller outside diameter lock, enabling the retainer to have a greater cross section in the critical area separating the inner spring steps from the tapered center hole. This provides superior strength and stability when compared to the competition, and these retainers are designed for use **only** with our Multi Fit locks. Compatible locks are offered for 8mm, 5/16", 11/32" and 3/8" valve stems in standard square groove and bead groove configurations. Optional assembly height locks are also offered, see pages 360-361.

### CONVENTIONAL DESIGN TITANIUM RETAINERS WITH 10° TAPER

Our conventional 10 degree titanium retainers are made from premium quality titanium alloy bar stock that is precisely machined on our own automated equipment. Each retainer is carefully quality control inspected for precision and accuracy. These retainers are available in the popular conventional 10° design, for strength and light weight. *Locks are sold separately*, see pages 360-361.

## How to Use the Valve Spring Retainer Dimension, Retainer Height, and Spring to Retainer Charts

The following pages supply you with specific information on the various valve spring retainers, valve stem locks, and their compatibility with the valve springs that Crane Cams offers. These parts can be used anywhere their physical size can be accommodated, and where the resulting spring tension and spring travel is compatible with the camshaft, rocker arms, and lifters. Different combinations of valve springs, retainers and/or locks can be selected to match your particular needs.

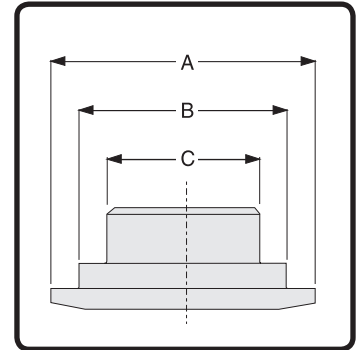
### SPRING RETAINER DIMENSIONS

Spring Retainer Dimensions are provided so you can determine how the retainer fits the valve springs, see pages 350-351.

Retainer Dimension "A" fits over the outer spring;

Retainer Dimension "B" fits into the I.D. of the outer spring;

Retainer Dimension "C" fits into the I.D. of the innermost spring.

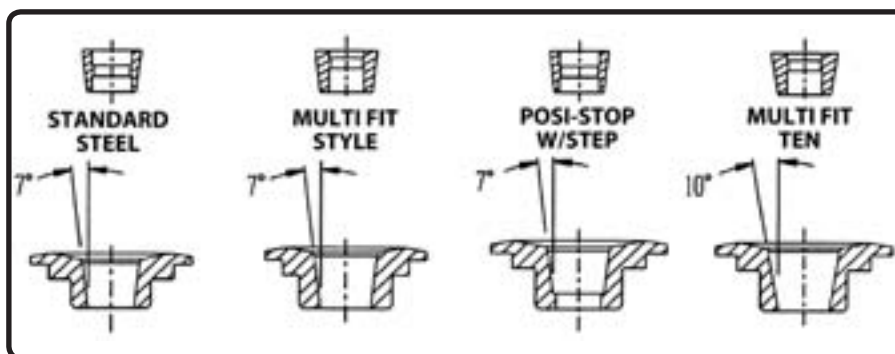


### RETAINER HEIGHT CHART

Crane presents a new simplified method of matching the proper valve spring retainers and valve stem locks to your required assembly height. Simply measure your cylinder head from the spring seat to the top of the valve stem lock groove on the valve, and compare that to your needed assembly height. The chart indicates the relative heights for all of our retainer and standard height lock combinations, from the outer spring step to the top of the lock groove. No fixtures or sample parts are required, just the ability to measure! You can also take advantage of our wide range of +.050" and -.050" height locks to further refine your choices. This way you can minimize the shims required to achieve proper heights and pressures, and provide a more stable platform for your valve springs. See pages 352-354.

### SPRING TO RETAINER CHART

This chart shows what retainers are available to fit a particular part number valve spring. It is based on the diameter of the spring and matching diameter of the retainers. It is further broken down by valve stem size, then the material and design of the retainer, see pages 355-357.



Crane Cams Has  
The Correct  
Valve Spring  
Retainers,  
Valve Springs  
And Valve Locks  
For Any  
Application...  
Street Or Race!

# Valve Spring Retainer Dimensions - Steel

Valve Stem Diam. Spring O.D., Type and Special Applications -----Retainer Dimensions-----  
A B C Part No.

## 7° Multi Fit Steel Retainers for 5/16", 11/32", and 3/8" Valve Stem Diameters

**For 5/16" square groove valve stems:** use **99093-1** (standard), **99085-1** (+.050"), or **99086-1** (-.050") valve stem locks  
**For 11/32" square groove valve stems:** use **99094-1** (standard), **99087-1** (+.050"), or **99088-1** (-.050") valve stem locks  
**For 3/8" square groove valve stems:** use **99098-1** (standard), **99099-1** (+.050"), or **99089-1** (-.050") valve stem locks  
**Valve stem locks** for 5/16", 11/32", and 3/8" valve stems with bead groove configuration also available, see pages 360-361.

|     |   |  |       |       |      |               |
|-----|---|--|-------|-------|------|---------------|
| ALL | 1.275" Dual                                 |  | 1.250 | .910  | .650 | <b>99975-</b> |
| ALL | 1.055/1.290" to 1.095/1.445" Conical Single |  | .980  | .640  |      | <b>99976-</b> |
| ALL | 1.430" to 1.500" Dual                       |  | 1.375 | 1.030 | .675 | <b>99950-</b> |
| ALL | 1.430" to 1.500" Dual or Triple             |  | 1.375 | 1.060 | .675 | <b>99948-</b> |
| ALL | 1.430" to 1.500" Dual or Triple             |  | 1.375 | 1.060 | .675 | <b>99957-</b> |
| ALL | 1.430" to 1.500" Single or Dual             |  | 1.425 | 1.060 | .685 | <b>99969-</b> |
| ALL | 1.430" to 1.500" Single or Dual             |  | 1.425 | 1.060 | .685 | <b>99973-</b> |
| ALL | 1.460" Dual                                 |  | 1.375 | 1.075 | .792 | <b>99954-</b> |
| ALL | 1.510" to 1.625" Dual                       |  | 1.500 | 1.100 | .690 | <b>99970-</b> |
| ALL | 1.510" to 1.625" Dual                       |  | 1.500 | 1.100 | .690 | <b>99974-</b> |
| ALL | 1.530" Dual                                 |  | 1.500 | 1.111 | .765 | <b>99962-</b> |
| ALL | 1.540" Dual                                 |  | 1.500 | 1.135 | .725 | <b>99964-</b> |
| ALL | 1.540" Dual                                 |  | 1.500 | 1.135 | .725 | <b>99961-</b> |
| ALL | 1.540" to 1.630" Dual or Triple             |  | 1.500 | 1.135 | .635 | <b>99955-</b> |

## 7° Steel Retainers for Specific Valve Stem Diameters and Applications

|        |   |                                 |       |       |      |                |
|--------|---|---------------------------------|-------|-------|------|----------------|
| 8mm    | 1.275" Dual                               | Chevrolet LS1/LS2/LS6 V-8       | 1.250 | .910  | .640 | <b>144944-</b> |
| 11/32" | 1.225" to 1.250" Single or Dual           | for self-aligning rocker arms   | 1.210 | .865  | .595 | <b>99914-</b>  |
| 11/32" | 1.225" to 1.250" Single or Dual           |                                 | 1.203 | .867  | .607 | <b>99916-</b>  |
| 11/32" | 1.225" to 1.250" Single or Dual           |                                 | 1.203 | .867  | .607 | <b>99915-</b>  |
| 11/32" | 1.295" top / 1.450" bottom Conical Single | Ford 302 H.O. V-8               | 1.250 | .859  |      | <b>99942-</b>  |
| 11/32" | 1.320" Dual                               | Ford SOHC 2.3L I-4              | 1.250 | .985  | .745 | <b>99967-</b>  |
| 11/32" | 1.344" Dual                               | Chevy L98/Fast Burn alum. heads | 1.275 | .990  | .720 | <b>99935-</b>  |
| 11/32" | 1.430" to 1.500" Single or Dual           |                                 | 1.375 | 1.030 | .675 | <b>99946-</b>  |
| 11/32" | 1.430" to 1.500" Single or Dual           |                                 | 1.375 | 1.060 | .675 | <b>99936-</b>  |
| 11/32" | 1.430" to 1.500" Single or Dual           |                                 | 1.375 | 1.060 | .675 | <b>99944-</b>  |
| 11/32" | 1.430" to 1.500" Single or Dual           |                                 | 1.375 | 1.060 | .675 | <b>99943-</b>  |
| 11/32" | 1.460" Dual                               |                                 | 1.375 | 1.075 | .792 | <b>99953-</b>  |
| 11/32" | 1.460" Dual for self-aligning rocker arms |                                 | 1.375 | 1.075 | .792 | <b>99951-</b>  |
| 11/32" | 1.540" to 1.630" Dual or Triple           |                                 | 1.500 | 1.135 | .635 | <b>99956-</b>  |

## 10° Multi Fit Steel Retainers

**For 5/16" square groove valve stems:** use **99071-1** (standard), **99072-1** (+.050"), or **99070-1** (-.050") valve stem locks  
**For 11/32" square groove valve stems:** use **99074-1** (standard), **99075-1** (+.050"), or **99073-1** (-.050") valve stem locks  
**For 3/8" square groove valve stems:** use **99077-1** (standard), **99078-1** (+.050"), or **99076-1** (-.050") valve stem locks  
**Valve stem locks** for 5/16", 11/32", and 3/8" valve stems with bead groove configuration also available, see pages 360-361.

|     |                                 |  |       |       |      |               |
|-----|---------------------------------|--|-------|-------|------|---------------|
| ALL | 1.430" to 1.500" Single or Dual |  | 1.425 | 1.060 | .685 | <b>99971-</b> |
| ALL | 1.510" to 1.625" Dual           |  | 1.500 | 1.100 | .690 | <b>99972-</b> |

**NOTE:** These recommended locks differ from competing conventional 10° locks and they increase the breakage strength of our Multi-Fit titanium retainers by 25%. Also, many competing 10 degree locks vary in production from 9° to 11-1/2°. Because of the accurate, robust design of Crane locks, they are incompatible with most competitors 10° retainers, and competitor's locks won't work with Crane Multi Fit 10° retainers.

## Steel Retainers with Unique Taper for Specific Applications

|        |  |  |       |       |      |               |
|--------|--|--|-------|-------|------|---------------|
| 11/32" | 1.225" to 1.250" Single or Dual for Buick, 11° Taper |  | 1.200 | .867  | .599 | <b>99912-</b> |
| 3/8"   | 1.430" to 1.500" Dual for Buick, 11° Taper           |  | 1.375 | 1.075 | .698 | <b>99910-</b> |

**NOTE:** The retainers are packaged in various quantities depending on the engine application. The suffix number (after the dash) in the part number indicates the quantity. For example, part no 99944-16 would be packaged with 16 retainers. Consult the engine application pages or the numerical price list for the correct quantity suffix.

**NOTE:** See pages 352-354 for our new Retainer Height Chart.



# Valve Spring Retainer Dimensions - Titanium



| Valve Stem Diam.  | Spring O.D., Type and Special Applications | -----Retainer Dimensions-----            |            |       | Part No.      |                 |                |
|---|--|--|------------|-------|---------------|-----------------|----------------|
|   |  | A  | B          | C     |               |                 |                |
| <b>7° Multi Fit Titanium Retainers for 5/16", 11/32", and 3/8" Valve Stem Diameters</b>   |  |  |            |       |               |                 |                |
| <p><i>For 5/16" square groove valve stems:</i> use <b>99093-1</b> (standard), <b>99085-1</b> (+.050"), or <b>99086-1</b> (-.050") valve stem locks<br/> <i>For 11/32" square groove valve stems:</i> use <b>99094-1</b> (standard), <b>99087-1</b> (+.050"), or <b>99088-1</b> (-.050") valve stem locks<br/> <i>For 3/8" square groove valve stems:</i> use <b>99098-1</b> (standard), <b>99099-1</b> (+.050"), or <b>99089-1</b> (-.050") valve stem locks<br/> <b>Valve stem locks</b> for 5/16", 11/32", and 3/8" valve stems with bead groove configuration also available, see pages 360-361.</p> |  |  |            |       |               |                 |                |
| ALL   | 1.275" Dual                                | 1.250                                    | .918       | .640  | <b>99657-</b> |                 |                |
| ALL   | 1.500" to 1.550" Dual                      | 1.400                                    | 1.040      | .715  | <b>99663-</b> |                 |                |
| ALL   | 1.530" to 1.550" Dual                      | 1.440                                    | 1.105      | .687  | <b>99659-</b> |                 |                |
| ALL   | 1.540" to 1.595" Dual                      | 1.500                                    | 1.150      | .720  | <b>99655-</b> |                 |                |
| ALL   | 1.550" Dual                                | 1.440                                    | 1.090      | .695  | <b>99661-</b> |                 |                |
| ALL   | 1.625" Dual                                | 1.510                                    | 1.165      | .760  | <b>99660-</b> |                 |                |
| ALL   | 1.625" to 1.675" Triple                    | 1.500                                    | 1.180/.860 | .620  | <b>99656-</b> |                 |                |
| ALL   | 1.645" Triple                              | 1.530                                    | 1.185      | .860  | <b>99662-</b> |                 |                |
| <b>7° Titanium Retainers for Specific Valve Stem Diameters and Applications</b>   |  |  |            |       |               |                 |                |
| 5.5mm   | 1.000" Single                              | Ford Duratec 1.8 – 2.3L DOHC 4 Valve I-4 |            | .945  | .710          | <b>903-0503</b> |                |
| 6mm   | .999" top/1.095" bottom Beehive Single     | Ford 4.6 - 5.4L 3 Valve V-8              |            | .885  | .615          | <b>39660-</b>   |                |
| 6mm   | 1.065" Single                              | Chrysler/Dodge SOHC/DOHC 4 Valve I-4     |            | .995  | .715          | <b>158660-</b>  |                |
| 7mm   | .930" top/1.025" bottom Beehive Single     | Ford 4.6 - 5.4L 4 Valve V-8              |            | .850  | .560          | <b>40660-</b>   |                |
| 7mm   | .967" top/1.096" bottom Beehive Single     | Ford 4.6 - 5.4L 2 Valve V-8              |            | .885  | .615          | .503            | <b>37660-</b>  |
| 8mm   | 1.055" top/1.290" bottom Beehive Single    | Chevrolet LS1/LS2/LS6 V-8                |            | .974  | .620          | <b>99637-</b>   |                |
| 8mm   | 1.255" Single                              |  |            | 1.180 | .856          | <b>99658-</b>   |                |
| 8mm   | 1.275" Dual                                | Chevrolet LS1/LS2/LS6 V-8                |            | 1.250 | .910          | .640            | <b>144661-</b> |
| <b>7° Posi-Stop Titanium Retainers for Specific Valve Stem Diameters</b>  |  |  |            |       |               |                 |                |
| 11/32"  | 1.430" to 1.500" Dual                      | 1.375                                    | 1.045      | .703  | <b>99669-</b> |                 |                |
| 11/32"  | 1.540" Dual                                | 1.500                                    | 1.135      | .740  | <b>99675-</b> |                 |                |
| 11/32"  | 1.560" to 1.630" Triple                    | 1.500                                    | 1.135      | .635  | <b>99678-</b> |                 |                |
| 11/32"  | 1.560" to 1.630" Triple                    | 1.500                                    | 1.135      | .635  | <b>99681-</b> |                 |                |
| 3/8"  | 1.540" Dual                                | 1.500                                    | 1.135      | .740  | <b>99676-</b> |                 |                |
| 3/8"  | 1.560" to 1.630" Triple                    | 1.500                                    | 1.135      | .635  | <b>99679-</b> |                 |                |
| <b>NOTE:</b> All "Posi-Stop" Titanium Retainers are packaged with appropriate Crane Cams machined valve stem locks.   |  |  |            |       |               |                 |                |
| <b>10° Crane Multi Fit Titanium Retainers</b>   |  |  |            |       |               |                 |                |
| <p><i>For 5/16" square groove valve stems:</i> use <b>99071-1</b> (standard), <b>99072-1</b> (+.050"), or <b>99070-1</b> (-.050") valve stem locks<br/> <i>For 11/32" square groove valve stems:</i> use <b>99074-1</b> (standard), <b>99075-1</b> (+.050"), or <b>99073-1</b> (-.050") valve stem locks<br/> <i>For 3/8" square groove valve stems:</i> use <b>99077-1</b> (standard), <b>99078-1</b> (+.050"), or <b>99076-1</b> (-.050") valve stem locks<br/> <b>Valve stem locks</b> for 5/16", 11/32", and 3/8" valve stems with bead groove configuration also available, see pages 360-361.</p> |  |  |            |       |               |                 |                |
| ALL   | 1.540" to 1.595" Dual                      | 1.500                                    | 1.150      | .720  | <b>99635-</b> |                 |                |
| ALL   | 1.625" to 1.675" Triple                    | 1.500                                    | 1.180/.860 | .620  | <b>99636-</b> |                 |                |
| <b>NOTE:</b> These recommended locks differ from competing conventional 10° locks and they increase the breakage strength of our Multi-Fit titanium retainers by 25%. Also, many competing 10 degree locks vary in production from 9° to 11-1/2°. Because of the accurate, robust design of Crane locks, they are incompatible with most competitors 10° retainers, and competitor's locks won't work with Crane Multi Fit 10° retainers.   |  |  |            |       |               |                 |                |
| <b>10° Conventional Titanium Retainers</b>  |  |  |            |       |               |                 |                |
| ALL   | 1.430" to 1.500" Dual or Triple            | 1.375                                    | 1.060      | .675  | <b>99630-</b> |                 |                |
| ALL   | 1.500" to 1.550" Dual                      | 1.400                                    | 1.040      | .715  | <b>99640-</b> |                 |                |
| ALL   | 1.510" to 1.625" Dual                      | 1.500                                    | 1.100      | .690  | <b>99641-</b> |                 |                |
| ALL   | 1.550" Dual                                | 1.440                                    | 1.090      | .695  | <b>99639-</b> |                 |                |
| ALL   | 1.540" to 1.560" Dual                      | 1.500                                    | 1.120      | .735  | <b>99631-</b> |                 |                |
| ALL   | 1.550" to 1.560" Dual                      | 1.500                                    | 1.095      | .700  | <b>99634-</b> |                 |                |
| ALL   | 1.560" to 1.630" Triple                    | 1.500                                    | 1.135      | .635  | <b>99632-</b> |                 |                |
| ALL   | 1.625" Dual                                | 1.500                                    | 1.170      | .764  | <b>99633-</b> |                 |                |
| ALL   | 1.625" Dual                                | 1.510                                    | 1.165      | .760  | <b>99638-</b> |                 |                |
| <b>NOTE:</b> These retainers can be used with 11/32" or 3/8" valve stems with single keeper grooves provided that the appropriate conventional 10 degree valve stem locks are used: <b>99080-1</b> for 5/16"; <b>99081-1</b> for 11/32"; <b>99082-1</b> for 3/8". See page 361 for +.050" and -.050" optional locks.  |  |  |            |       |               |                 |                |

**NOTE:** The retainers are packaged in various quantities depending on the engine application. The suffix number (after the dash) in the part number indicates the quantity. For example, part no 99944-16 would be packaged with 16 retainers. Consult the engine application pages or the numerical price list for the correct quantity suffix.  
**NOTE:** See pages 352-354 for our new Retainer Height Chart.

# Valve Spring Retainer Height Chart

## Retainer Height Chart

To be able to achieve the proper valve spring height, while using the minimum amount of valve spring shims, can be challenging when working with applications that use other than stock components. There has never been an industry standard to compare the relationship of retainer heights with each other, although we have previously listed our retainer heights by comparing them with each other. This has been somewhat helpful if you have at least one of our retainers on hand for comparison purposes, but doesn't properly address the variations of valve stem diameters, valve stem lock thicknesses, and taper angles.

With this new listing, we are providing a measurable dimension that can be easily checked for the cylinder head and valve combination you're working with. No sample retainers or fixtures are needed. The Retainer Height dimensions listed indicate the relationship of the outer step of the retainer that the outer valve spring sets against, with the top of the valve stem lock groove in the valve stem.

If the dimension on the chart is  $.000''$ , the outer retainer step, and the top of the lock groove are at the same height. If the dimension is positive, such as  $.060''$ , then the outer retainer step is  $.060''$  above the top of the lock groove. If the dimension is negative, such as  $-.040''$ , then the outer spring step is  $.040''$  below the top of the lock groove. Check the accompanying drawings for a visual explanation.

This will enable you to measure from the valve spring seat on the cylinder head, to the top of the lock groove in the valve, then compare that dimension to your desired valve spring assembly height (see the Valve Spring Retainer Dimension pages 350-351, and the Valve Spring to Retainer Cross Reference pages 355-357 for additional information). If you need an assembly height that's  $.060''$  higher than your measured dimension, check the listings for the applicable retainers for your valve springs, and look for a height figure close to  $.060''$ .

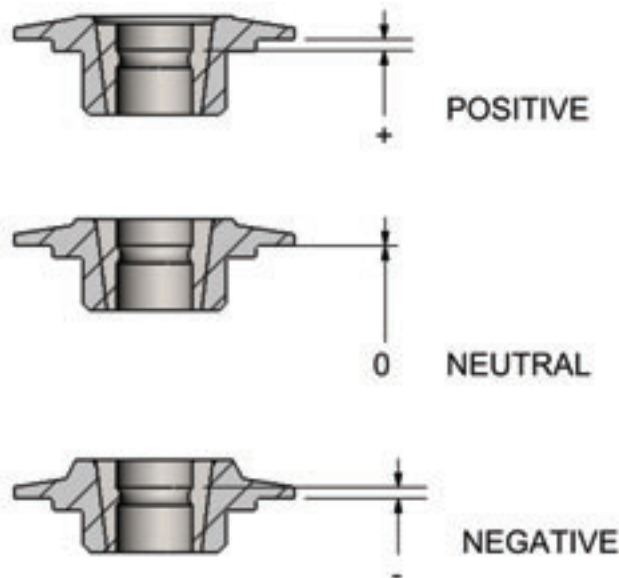
The standard height Crane Cams valve stem lock part numbers are listed with each diameter valve stem (where applicable) to achieve these figures. Remember, most of our valve stem locks are also available in  $+.050''$  and  $-.050''$  heights (see pages 360-361), to extend the available height combinations that can be created.

The retainers are listed by material, then by lock configuration.

The valve stems are listed by diameter and lock groove configuration.

Certain unique specific retainers are listed using their usual valve locks, such as the Buick 11 degree, and the Ford Modular items.

We hope this will make choosing your components easier, and provide a more reliable valve spring retainer/valve stem lock combination for your application.



# Valve Spring Retainer Height Chart



## Steel Retainers

| Retainer Part No.                  | Valve Stem Diameter<br>(Valve Stem Lock Part No.) |                           |                           |                            |                         |                          |                          |
|------------------------------------|---|---------------------------|---------------------------|----------------------------|-------------------------|--------------------------|--------------------------|
| <b>7° Crane Multi Fit and 3/8"</b> |   |                           |                           |                            |                         |                          |                          |
|                                    | 5/16 sq.<br><b>99093</b>                          | 5/16 bead<br><b>99101</b> | 11/32 sq.<br><b>99094</b> | 11/32 bead<br><b>99104</b> | 3/8 sq.<br><b>99098</b> | 7mm bead<br><b>99106</b> | 8mm bead<br><b>99107</b> |
| 99948                              | -.055   | -.055                     | -.050                     | -.050                      | -.080                   | -.055                    | -.055                    |
| 99950                              | .045  | .045                      | .050                      | .050                       | .020                    | .045                     | .045                     |
| 99954                              | .040  | .040                      | .045                      | .045                       | .015                    | .040                     | .040                     |
| 99955                              | .055  | .055                      | .060                      | .060                       | .030                    | .055                     | .055                     |
| 99957                              | .045  | .045                      | .050                      | .050                       | .020                    | .045                     | .045                     |
| 99961                              | .125  | .125                      | .130                      | .130                       | .100                    | .125                     | .125                     |
| 99962                              | .125  | .125                      | .130                      | .130                       | .100                    | .125                     | .125                     |
| 99964                              | .040  | .040                      | .045                      | .045                       | .015                    | .040                     | .040                     |
| 99969                              | .045  | .045                      | .050                      | .050                       | .020                    | .045                     | .045                     |
| 99970                              | .045  | .045                      | .050                      | .050                       | .020                    | .045                     | .045                     |
| 99973                              | .110  | .110                      | .115                      | .115                       | .085                    | .110                     | .110                     |
| 99974                              | .110  | .110                      | .115                      | .115                       | .085                    | .110                     | .110                     |
| 99975                              | -.005   | -.005                     | .000                      | .000                       | -.030                   | -.005                    | -.005                    |
| 99976                              | .010  | .010                      | .015                      | .015                       | -.015                   | .010                     | .010                     |
| <b>7° Specific</b>                 |   |                           |                           |                            |                         |                          |                          |
|                                    | 11/32 sq.<br><b>99097</b>                         | 8mm bead<br><b>99108</b>  |                           |                            |                         |                          |                          |
| 99914                              | .035  |                           |                           |                            |                         |                          |                          |
| 99915                              | .020  |                           |                           |                            |                         |                          |                          |
| 99916                              | -.055   |                           |                           |                            |                         |                          |                          |
| 99935                              | .075  |                           |                           |                            |                         |                          |                          |
| 99936                              | .005  |                           |                           |                            |                         |                          |                          |
| 99942                              | .285  |                           |                           |                            |                         |                          |                          |
| 99943                              | .135  |                           |                           |                            |                         |                          |                          |
| 99944                              | .075  |                           |                           |                            |                         |                          |                          |
| 99946                              | .075  |                           |                           |                            |                         |                          |                          |
| 99951                              | .135  |                           |                           |                            |                         |                          |                          |
| 99953                              | .135  |                           |                           |                            |                         |                          |                          |
| 99956                              | .125  |                           |                           |                            |                         |                          |                          |
| 99966                              | .135  |                           |                           |                            |                         |                          |                          |
| 99967                              | .215  |                           |                           |                            |                         |                          |                          |
| 144944                             |   | -.030                     |                           |                            |                         |                          |                          |
| <b>10° Crane Multi Fit</b>         |   |                           |                           |                            |                         |                          |                          |
|                                    | 5/16 sq.  | 11/32 sq.                 | 3/8 sq.                   |                            |                         |                          |                          |
| 99971                              | .030  | .055                      | .045                      |                            |                         |                          |                          |
| 99972                              | .030  | .055                      | .045                      |                            |                         |                          |                          |
| <b>11° Specific</b>                |   |                           |                           |                            |                         |                          |                          |
| 99912                              | 11/32 Buick                                       | -.060                     |                           |                            |                         |                          |                          |
| 99910                              | 3/8 Buick   | -.085                     |                           |                            |                         |                          |                          |

Section Continued

# Valve Spring Retainer Height Chart

## Titanium Retainers

| Retainer Part No.                  | Valve Stem Diameter<br>(Valve Stem Lock Part No.) |                           |                           |                            |                         |                          |                          |
|------------------------------------|---|---------------------------|---------------------------|----------------------------|-------------------------|--------------------------|--------------------------|
| <b>7° Crane Multi Fit and 3/8"</b> |   |                           |                           |                            |                         |                          |                          |
|                                    | 5/16 sq.<br><b>99093</b>                          | 5/16 bead<br><b>99101</b> | 11/32 sq.<br><b>99094</b> | 11/32 bead<br><b>99104</b> | 3/8 sq.<br><b>99098</b> | 7mm bead<br><b>99106</b> | 8mm bead<br><b>99107</b> |
| 99655                              | .045  | .045                      | .050                      | .050                       | .020                    | .045                     | .045                     |
| 99656                              | .045  | .045                      | .050                      | .050                       | .020                    | .045                     | .045                     |
| 99657                              | -.005   | -.005                     | .000                      | .000                       | -.030                   | -.005                    | -.005                    |
| 99659                              | .115  | .115                      | .115                      | .115                       | .085                    | .115                     | .115                     |
| 99660                              | .115  | .115                      | .115                      | .115                       | .085                    | .115                     | .115                     |
| 99661                              | .115  | .115                      | .115                      | .115                       | .085                    | .115                     | .115                     |
| 99662                              | .115  | .115                      | .115                      | .115                       | .085                    | .115                     | .115                     |
| 99663                              | .115  | .115                      | .115                      | .115                       | .085                    | .115                     | .115                     |
| <b>7° Specific</b>                 |   |                           |                           |                            |                         |                          |                          |
| 37660                              | 7mm 3-groove                                      | -.070                     |                           |                            |                         |                          |                          |
| 39660                              | 6mm   | .050                      |                           |                            |                         |                          |                          |
| 158660                             | 6mm   | .025                      |                           |                            |                         |                          |                          |
| 40660                              | 7mm 3-groove                                      | .000                      |                           |                            |                         |                          |                          |
| 99637                              | 8mm   | -.140                     |                           |                            |                         |                          |                          |
| 99658                              | 8mm   | -.055                     |                           |                            |                         |                          |                          |
| 144661                             | 8mm   | -.030                     |                           |                            |                         |                          |                          |
| 903-0503                           | 5.5mm   | .020                      |                           |                            |                         |                          |                          |
| <b>7° "Posi-Stop" Specific</b>     |   |                           |                           |                            |                         |                          |                          |
|                                    | 11/32 sq.<br><b>99097</b>                         | 3/8 sq.<br><b>99098</b>   |                           |                            |                         |                          |                          |
| 99669                              | .075  |                           |                           |                            |                         |                          |                          |
| 99675                              | .150  |                           |                           |                            |                         |                          |                          |
| 99676                              |   | .060                      |                           |                            |                         |                          |                          |
| 99678                              | .075  |                           |                           |                            |                         |                          |                          |
| 99679                              |   | .030                      |                           |                            |                         |                          |                          |
| 99681                              | .165  |                           |                           |                            |                         |                          |                          |
| <b>10° Crane Multi Fit</b>         |   |                           |                           |                            |                         |                          |                          |
|                                    | 5/16 sq.<br><b>99071</b>                          | 11/32 sq.<br><b>99074</b> | 3/8 sq.<br><b>99077</b>   |                            |                         |                          |                          |
| 99635                              | .030  | .055                      | .045                      |                            |                         |                          |                          |
| 99636                              | .030  | .055                      | .045                      |                            |                         |                          |                          |
| <b>10° Conventional</b>            |   |                           |                           |                            |                         |                          |                          |
|                                    | 5/16 sq.<br><b>99080</b>                          | 5/16 bead<br><b>99115</b> | 11/32 sq.<br><b>99081</b> | 11/32 bead<br><b>99116</b> | 3/8 sq.<br><b>99082</b> | 3/8 bead<br><b>99117</b> |                          |
| 99630                              | .110  | .110                      | .110                      | .110                       | .080                    | .080                     |                          |
| 99631                              | .150  | .150                      | .150                      | .150                       | .120                    | .120                     |                          |
| 99632                              | .095  | .095                      | .095                      | .095                       | .065                    | .065                     |                          |
| 99633                              | .095  | .095                      | .095                      | .095                       | .065                    | .065                     |                          |
| 99634                              | .045  | .045                      | .045                      | .045                       | .015                    | .015                     |                          |
| 99638                              | .115  | .115                      | .115                      | .115                       | .115                    | .115                     |                          |
| 99639                              | .115  | .115                      | .115                      | .115                       | .115                    | .115                     |                          |
| 99640                              | .115  | .115                      | .115                      | .115                       | .115                    | .115                     |                          |
| 99641                              | .155  | .155                      | .155                      | .155                       | .155                    | .155                     |                          |

# Valve Spring to Retainer Cross Reference



## Single Springs

| Valve Spring Part No. | -----7° Steel Retainer ----- |  |                                  | 10° Steel Retainer | ----Titanium Retainer ---- |       | Spring Seat (I.D.)                              |
|-----------------------|------------------------------|--|----------------------------------|--------------------|----------------------------|-------|---|
|                       | 5/16"                        | 11/32"   | 3/8"                             |                    | 7°                         | 10°   |   |
| 37830                 | None                         | None   | None                             | None               | 37660                      | None  | None  |
| 40830                 | None                         | None   | None                             | None               | 40660                      | None  | None  |
| 96801                 | 99969                        | 99936<br>99943<br>99944<br>99969                   | 99948<br>99957<br>99969          | 99971              | None                       | None  | None  |
| 96802                 | None                         | 99914<br>99915<br>99916                            | None                             | None               | None                       | None  | None  |
| 96803                 | 99969                        | 99946<br>99969                                     | 99950<br>99969                   | 99971              | None                       | None  | None  |
| 96806                 | 99969                        | 99936<br>99943<br>99944<br>99951<br>99953<br>99969 | 99948<br>99954<br>99957<br>99969 | 99971              | None                       | None  | None  |
| 96807                 | 99962<br>99970               | 99962<br>99970                                     | 99962<br>99970                   | 99972              | None                       | 99641 | None  |
| 96845                 | None                         | None   | None                             | None               | 903-0503                   | None  | None  |
| 99831                 | 99976                        | 99976  | 99976                            | None               | 99637                      | None  | 99468 (.637")                                   |
| 99832                 | 99976                        | 99976  | 99976                            | None               | 99637                      | None  | 99456 (.500")<br>99457 (.570")<br>99458 (.637") |
| 99833                 | 99950                        | 99936<br>99943<br>99944<br>99946<br>99950          | 99948<br>99950<br>99957          | None               | None                       | 99630 | 99457 (.570")                                   |
| 99835                 | 99950<br>99969               | 99936<br>99943<br>99944<br>99950<br>99969          | 99948<br>99950<br>99957<br>99969 | 99971              | None                       | 99630 | 99459 (.637")                                   |
| 99839                 | 99950<br>99969               | 99936<br>99943<br>99944<br>99950<br>99969          | 99948<br>99950<br>99957<br>99969 | 99971              | None                       | 99630 | 99459 (.637")                                   |
| 99840                 | 99950<br>99969               | 99936<br>99943<br>99944<br>99950<br>99969          | 99948<br>99950<br>99957<br>99969 | 99971              | None                       | 99630 | 99457 (.570")                                   |
| 99841                 | None                         | 99942  | None                             | None               | None                       | None  | None  |
| 99842                 | None                         | None   | None                             | None               | None                       | None  | None  |
| 99846                 | None                         | 99914<br>99915<br>99916                            | None                             | None               | None                       | None  | None  |
| 99848                 | None                         | 99914<br>99915<br>99916                            | None                             | None               | None                       | None  | None  |

Section Continued

# Valve Spring to Retainer Cross Reference

## Single Springs

| Valve Spring Part No. | -----7° Steel Retainer ----- |                         |      | 10° Steel Retainer | ----Titanium Retainer ---- |      | Spring Seat (I.D.) |
|-----------------------|------------------------------|-------------------------|------|--------------------|----------------------------|------|--------------------|
|                       | 5/16"                        | 11/32"                  | 3/8" |                    | 7°                         | 10°  |                    |
| 144846                | None                         | 99914<br>99915<br>99916 | None | None               | 99658                      | None | None               |
| 158830                | None                         | None                    | None | None               | 158660                     | None | None               |
| 180830                | None                         | None                    | None | None               | 158660                     | None | None               |

## Dual Springs

| Valve Spring Part No. | -----7° Steel Retainer -----     |   |   | 10° Steel Retainer | ---7° Titanium Posi-Stop--- |                         |                | --Titanium Retainer-- |                         | 8mm  | Spring Seat (I.D.) |
|-----------------------|----------------------------------|---|---|--------------------|-----------------------------|-------------------------|----------------|-----------------------|-------------------------|------|--------------------|
|                       | 5/16"                            | 11/32"                                    | 3/8"                                      |                    | 5/16"                       | 11/32"                  | 3/8"           | 7°                    | 10°                     |      |                    |
| 96870                 | 99969                            | 99936<br>99943<br>99944<br>99969          | 99957<br>99969                            | 99971              | None                        | 99669                   | None           | None                  | 99630                   | None | 99465 (.570")      |
| 96872                 | 99969                            | 99936<br>99943<br>99944<br>99969          | 99948<br>99957<br>99969                   | 99971              | None                        | 99669                   | None           | None                  | 99630                   | None | 99465 (.570")      |
| 96873                 | 99969                            | 99936<br>99943<br>99944<br>99969          | 99948<br>99957<br>99969                   | 99971              | None                        | 99669                   | None           | None                  | 99630                   | None | 99465 (.570")      |
| 96874                 | 99969                            | 99936<br>99943<br>99944<br>99969          | 99948<br>99957<br>99969                   | 99971              | None                        | 99669                   | None           | None                  | 99630                   | None | 99465 (.570")      |
| 96877                 | 99969                            | 99936<br>99943<br>99944<br>99969          | 99948<br>99957<br>99969                   | 99971              | None                        | 99669                   | None           | None                  | 99630                   | None | 99465 (.570")      |
| 96878                 | 99970<br>99974                   | 99970<br>99974                            | 99970<br>99974                            | 99972              | None                        | None                    | None           | 99659                 | 99634<br>99641          | None | 99460 (.570")      |
| 96879                 | 99970<br>99974                   | 99970<br>99974                            | 99970<br>99974                            | 99972              | None                        | None                    | None           | 99659                 | 99634<br>99641          | None | 99465 (.570")      |
| 96883                 | 99970<br>99974                   | 99970<br>99974                            | 99970<br>99974                            | 99972              | None                        | 99678<br>99681          | 99679          | 99659                 | 99641                   | None | 99460 (.570")      |
| 96884                 | 99961<br>99964<br>99970<br>99974 | 99956<br>99961<br>99964<br>99970<br>99974 | 99955<br>99961<br>99964<br>99970<br>99974 | 99972              | None                        | 99675<br>99678<br>99681 | 99676<br>99679 | None                  | 99631<br>99632<br>99641 | None | 99460 (.570")      |
| 96885                 | 99970<br>99974                   | 99970<br>99974                            | 99970<br>99974                            | 99972              | None                        | 99675                   | None           | None                  | 99631<br>99632<br>99663 | None | 99460 (.570")      |
| 96886                 | 99970<br>99974                   | 99970<br>99974                            | 99970<br>99974                            | 99972              | None                        | None                    | None           | 99659                 | 99634<br>99641          | None | 99465 (.570")      |
| 96887                 | None                             | 99935                                     | None                                      | None               | None                        | None                    | None           | None                  | None                    | None | None               |
| 99838                 | 99969                            | 99936<br>99943<br>99944<br>99969          | 99948<br>99957<br>99969                   | 99971              | None                        | 99669                   | None           | None                  | 99630                   | None | None               |

VALVE TRAIN

Section Continued 

# Valve Spring to Retainer Cross Reference



## Dual Springs

| Valve Spring Part No. | -----7° Steel Retainer -----     |   |   | 10° Steel Retainer | ---7° Titanium Posi-Stop--- |                |       | --Titanium Retainer-- |                | 8mm    | Spring Seat (I.D.)             |
|-----------------------|----------------------------------|---|---|--------------------|-----------------------------|----------------|-------|-----------------------|----------------|--------|--------------------------------|
|                       | 5/16"                            | 11/32"                                    | 3/8"                                      |                    | 5/16"                       | 11/32"         | 3/8"  | 7°                    | 10°            |        |                                |
| 99876                 | 99970<br>99974                   | 99956<br>99970<br>99974                   | 99955<br>99970<br>99974                   | 99972              | None                        | 99678<br>99681 | 99676 | None                  | 99631<br>99632 | None   | 99460 (.570")<br>99464 (.637") |
| 99879                 | None                             | None                                      | None                                      | None               | None                        | None           | None  | None                  | None           | 99926  | None                           |
| 99880                 | 99962                            | 99962                                     | 99962                                     | 99972              | None                        | 99675          | 99676 | 99655                 | 99633          | None   | 99466 (.570")<br>99463 (.637") |
| 99884                 | None                             | 99967                                     | None                                      | None               | None                        | None           | None  | None                  | None           | None   | None                           |
| 99885                 | 99961<br>99964<br>99970<br>99974 | 99956<br>99961<br>99964<br>99970<br>99974 | 99955<br>99961<br>99964<br>99970<br>99974 | 99972              | None                        | 99678<br>99681 | 99676 | None                  | 99634<br>99641 | None   | 99460 (.570")<br>99464 (.637") |
| 99890                 | 99962<br>99970<br>99974          | 99962<br>99970<br>99974                   | 99962<br>99970<br>99974                   | 99972              | None                        | None           | None  | 99659                 | 99641          | None   | 99466 (.570")                  |
| 99891                 | None                             | 99912<br>99914<br>99915<br>99916          | None                                      | None               | None                        | None           | None  | None                  | None           | None   | None                           |
| 99892                 | 99954                            | 99951<br>99953<br>99954                   | 99954                                     | 99971              | None                        | None           | None  | None                  | None           | 99639  | None                           |
| 99893                 | 99952<br>99969                   | 99951<br>99953<br>99969                   | 99954<br>99969                            | 99971              | None                        | 99669          | None  | None                  | 99630          | None   | None                           |
| 99895                 | 99961                            | 99956                                     | 99955                                     | 99972              | None                        | 99675          | 99676 | None                  | 99631          | None   | 99466 (.570")                  |
| 99896                 | 99964<br>99970<br>99974          | 99961<br>99964<br>99970<br>99974          | 99961<br>99964<br>99970<br>99974          |                    |                             | 99678<br>99681 | 99679 |                       | 99632<br>99641 |        | 99464 (.637")                  |
| 144838                | 99975                            | 99975                                     | 99975                                     | None               | None                        | None           | None  | 99657                 | None           | 144661 | None                           |
| 144847                | 99975                            | 99975                                     | 99975                                     | None               | None                        | None           | None  | None                  | None           | 144661 | None                           |
| 961224                | None                             | None                                      | None                                      | None               | None                        | None           | None  | 99660                 | 99638          | None   | 99463 (.637")                  |
| 961226                | None                             | None                                      | 99970<br>99974                            | 99972              | None                        | None           | None  | 99661                 | 99639          | None   | 99465 (.570")                  |
| 961228                | None                             | None                                      | None                                      | None               | None                        | None           | None  | 99660                 | 99638          | None   | 99463 (.637")                  |
| 961299                | None                             | None                                      | None                                      | None               | None                        | None           | None  | 99660                 | 99638          | None   | 99466 (.570")<br>99463 (.637") |
| 961325                | None                             | None                                      | 99970<br>99974                            | 99972              | None                        | None           | None  | 99661                 | 99639<br>99641 | None   | 99464 (.637")                  |
| 961326                | None                             | None                                      | 99970<br>99974                            | 99972              | None                        | None           | None  | 99661                 | 99639<br>99641 | None   | 99465 (.570")<br>99464 (.637") |
| 961354                | None                             | None                                      | 99970<br>99974                            | 99972              | None                        | None           | None  | 99663                 | 99640          | None   | 99465 (.570")<br>99455 (.637") |
| 961355                | None                             | None                                      | 99970<br>99974                            | 99972              | None                        | None           | None  | 99663                 | 99640          | None   | 99465 (.570")<br>99455 (.637") |
| 961356                | None                             | None                                      | 99970<br>99974                            | 99972              | None                        | None           | None  | 99663                 | 99640          | None   | 99465 (.570")<br>99455 (.637") |
| 961360                | None                             | None                                      | 99970<br>99974                            | 99972              | None                        | None           | None  | 99663                 | 99640          | None   | 99465 (.570")<br>99455 (.637") |

## Triple Springs

|        |      |      |      |      |      |                |       |       |                |      |               |
|--------|------|------|------|------|------|----------------|-------|-------|----------------|------|---------------|
| 96848  | None | None | None | None | None | 99678<br>99681 | 99679 | 99656 | 99632<br>99636 | None | None          |
| 96849  | None | None | None | None | None | 99678<br>99681 | 99679 | 99656 | 99632<br>99636 | None | None          |
| 96888  | None | None | None | None | None | 99678<br>99681 | 99679 | 99656 | 99632<br>99636 | None | None          |
| 961246 | None | None | None | None | None | None           | None  | 99662 | None           | None | 99461 (.637") |
| 961347 | None | None | None | None | None | None           | None  | 99662 | None           | None | 99461 (.637") |
| 961348 | None | None | None | None | None | None           | None  | 99662 | None           | None | 99461 (.637") |

# Valve Spring and Retainer Kits

## Valve Spring and Retainer Kits

Crane Cams Valve Spring and Retainer Kits offer an easy, cost-saving method of insuring that your performance camshaft installation has the correct, matched valve springs and retainers needed to deliver maximum performance. These springs are designed to allow the increased RPM and more aggressive valve train operation that allows a Crane performance cam installation to “wake up” even stock engines. Crane steel and titanium valve spring retainers are designed to correctly fit the supplied Crane springs. The steel retainers are made from premium quality steel, precisely machined and heat treat hardened for strength, durability and wear resistance. The titanium retainers are manufactured from certified American made bar stock. Best of all, most of these Crane Valve Spring and Retainer Kits can be easily installed with no cylinder head machining necessary.

Applications are available for popular I-4 and V-8 engines. Consult the engine applications pages for correct usage.



| Application  | Part No.   | -----Contents----- |           |
|--|--|--------------------|-----------|
|  |  | Valve Springs      | Retainers |
| <b>American Motors V-8 66-91, 290 thru 401</b>                             | 64308-1  | 99839-16           | 99957-16  |
| <b>Chevrolet V-8 67-87, 262 thru 400</b>                                   | 11308-1  | 99848-16           | 99915-16  |
| XHTCS material, Saturday Night Special                                     | 11309-1 <sup>a</sup><br>(Includes Locks 99095-1)                               | 99846-16           | 99915-16  |
| <b>Chevrolet V-8 57-99, 262-400</b>  | 11310-1 <sup>b</sup>   | 99838-16           | 99944-16  |
| Requires cylinder head machining   | 10308-1<br>(Includes Locks 99097-1 & Shims 99050-1)                            | 99893-16           | 99951-16  |
| <b>Chevrolet V-8 92-99, 350 LT1</b>  | 10309-1  | 99845-16           | 99914-16  |
| With iron cylinder heads   | 10309-1  | 99845-16           | 99914-16  |
| <b>Chevrolet V-8 94-99, 350 LT1</b>  | 10309-1  | 99845-16           | 99914-16  |
| With iron cylinder heads   | 10309-1  | 99845-16           | 99914-16  |
| <b>Chevrolet V-8 95-96, Vortech 350</b>                                    | 10309-1  | 99845-16           | 99914-16  |
| <b>Chevrolet V-8 97-Up, LS-series 4.8-5.3-5.7-6.0-6.2 litre</b>            | 144317-1<br>(includes spring seats 144460-16, seals 99818-16, & locks 99108-1) | 144838-16          | 144944-16 |
| For up to .680" gross valve lift   | 144316-1<br>(includes spring seats 144460-16, seals 99818-16, & locks 99108-1) | 144838-16          | 144661-16 |
| For up to .680" gross valve lift   | 144313-1<br>(includes spring seats 144460-16, seals 99818-16, & locks 99108-1) | 144847-16          | 144944-16 |
| For up to .660" gross valve lift, XHTCS material                           | 144314-1<br>(includes spring seats 144460-16, seals 99818-16, & locks 99108-1) | 144847-16          | 144661-16 |
| For up to .660" gross valve lift, XHTCS material                           | 13308-1  | 99839-16           | 99948-16  |
| <b>Chevrolet V-8 65-98, 396 thru 502</b>                                   | 13309-1  | 96801-16           | 99957-16  |
| <b>Chevrolet V-8 80-95, Truck 366 thru 454</b>                             | 903-2003   | 158830-16          | 158660-16 |
| With short valve spring assembly height                                    | 903-2002   | 180830-16          | 158660-16 |
| <b>Chrysler-Dodge Neon I-4 95-05, SOHC 4V 2.0L</b>                         | 69308-1  | 99835-16           | 99948-16  |
| <b>Chrysler-Dodge Neon, PT Cruiser I-4 95-09, DOHC 4V 2.0-2.4L</b>         | 64308-1  | 99839-16           | 99957-16  |
| <b>Chrysler-Dodge-Plymouth V-8 64-91, "LA" 273 thru 360 and 67-91, 318</b> |  |                    |           |
| <b>Chrysler-Dodge-Plymouth V-8 58-78, "B" 350 thru 440</b>                 |  |                    |           |

Section Continued



## Valve Spring and Retainer Kits

| Application   | Part No.                         | -----Contents----- |           |
|---|----------------------------------|--------------------|-----------|
|   |                                  | Valve Springs      | Retainers |
| <b>Ford Duratec I-4 02-05, DOHC 4V 1.8-2.0-2.3L</b>   | 903-2007                         | 99845-16           | 903-0503  |
| <b>Ford V-8 62-87, 221-302 and 69-97, 351W</b>  | 36308-1                          | 96803-16           | 99946-16  |
| Requires Cylinder Head Machining  | 11310-1 <sup>b</sup>             | 99838-16           | 99944-16  |
| <b>Ford V-8 85-00, 302 and 302 H.O. w/Hydraulic Roller Camshafts</b>                            | 44308-1 <sup>c</sup>             | 99841-16           | 99942-16  |
| Conical design, for stock cylinder head   | (Includes Locks 99094 and 99097) |                    |           |
| <b>Ford V-8 70-77, 351C-351M-400</b>  | 52308-1                          | 96801-16           | 99948-16  |
| <b>Ford V-8 71-72, Boss 351 and 79-82, 351M-400</b>   | 35308-1                          | 96801-16           | 99944-16  |
| <b>Ford V-8 63-76, FE 352 thru 428</b>  | 13309-1                          | 96801-16           | 99957-16  |
| <b>Ford V-8 68-97, 370 thru 460</b>   | 35308-1                          | 96801-16           | 99944-16  |
| <b>Oldsmobile V-8 67-84, 260 thru 455 39° Bank Angle and 64-67, 330 thru 425 45° Bank Angle</b> | 36308-1                          | 96803-16           | 99946-16  |
| Requires Cylinder Head Machining  | 11310-1 <sup>b</sup>             | 99838-16           | 99944-16  |
| <b>Pontiac V-8 55-81, 265 thru 455</b>  | 28308-1                          | 99840-16           | 99944-16  |
| Requires Cylinder Head Machining  | 11310-1 <sup>b</sup>             | 99838-16           | 99944-16  |

- <sup>a</sup> Standard diameter valve springs for 1967-87 cylinder heads with 1.700" assembly height. Check valve guide to lock/retainer clearance at maximum valve lift, valve guide machining may be required.
- <sup>b</sup> Must machine cylinder heads. Check valve guide to lock/retainer clearance at maximum valve lift, valve guide machining may be required.
- <sup>c</sup> Optional kit for 79-00 302, 302 H.O., and 351W engines to provide increased valve spring travel when using stock cylinder heads.

# Valve Stem Locks

## Machined Steel Locks 7°

### Single Groove Design

The ultimate in strength and wear resistance. These locks are machined from highest quality alloy steel billet material using the finest automatic screw machines and then carefully heat treated. Engineered specifically for today's high engine speeds and high-tension valve springs. These machined steel locks are the only locks to be used with our "Posi Lock" valve spring retainers. Oxide finished for corrosion protection, and color coded for assembly height identification.



| Description  | Part No. |
|--|----------|
| For 5/16" diameter Valve Stems (Black)                           | 99091-1  |
| For 11/32" diameter Valve Stems +.050" installed height (Yellow) | 99095-1  |
| For 11/32" diameter Valve Stems standard height (Black)          | 99097-1  |
| For 11/32" diameter Valve Stems -.050" installed height (Silver) | 99096-1  |
| For 3/8" diameter Valve Stems +.050" installed height (Yellow)   | 99099-1  |
| For 3/8" diameter Valve Stems standard height (Black)            | 99098-1  |
| For 3/8" diameter Valve Stems -.050" installed height (Silver)   | 99089-1  |

**NOTE:** This design lock is packaged with all Crane "Posi-Stop" Titanium Retainers.

## Machined Steel Locks 7°

### Single Bead Design

These machined steel locks are precision machined and heat treated in our own facility for the latest generation of engine technology. Although primarily designed for the Chevrolet LS1/LS2/LS6 families, they are also applicable to most valve stems that require a bead-style valve lock.



| Description                                     | Part No. |
|---|----------|
| For 8 mm Valve Stems (standard OEM dimension)   | 99108-1  |
| For 8 mm Valve Stems increased O.D. (Multi Fit) | 99107-1  |

## Multi-Fit Valve Stem Locks 7°

### Single Groove Design

Our steel billet heat treated Multi-Fit locks feature an increased outside diameter for additional strength, durability and fatigue resistance. These Multi-Fit locks are highly recommended for any high RPM, high valve spring tension, or heavy valve application prone to lock distortion and retainer pull-through. The 7° taper actually provides more clamping force than wider 10° taper locks and are the preferred choice of professional engine builders and racers. (Use only with Crane Multi-Fit retainers).



| Description  | Part No. |
|--|----------|
| For 5/16" diameter Valve Stems +.050" installed height (Yellow)  | 99085-1  |
| For 5/16" diameter Valve Stems standard height (Green)           | 99093-1  |
| For 5/16" diameter Valve Stems -.050" installed height (Silver)  | 99086-1  |
| For 11/32" diameter Valve Stems +.050" installed height (Yellow) | 99087-1  |
| For 11/32" diameter Valve Stems standard height (Green)          | 99094-1  |
| For 11/32" diameter Valve Stems -.050" installed height (Silver) | 99088-1  |
| For 3/8" diameter Valve Stems +.050" installed height (Yellow)   | 99099-1  |
| For 3/8" diameter Valve Stems standard height (Black)            | 99098-1  |
| For 3/8" diameter Valve Stems -.050" installed height (Silver)   | 99089-1  |

**NOTE:** Crane Locks are color coded for easier identification.

Section Continued →

## Multi-Fit Valve Stem Locks 7°

### Single Bead Design

Our steel billet heat treated Single Bead Multi-Fit locks provide all of the strength and durability advantages of our single square groove design, and are compatible with most of the aftermarket bead lock valves currently available. Also available in  $+.050''$  and  $-.050''$  assembly height versions for 5/16" and 11/32" valve stems, these are designed specifically for use with only our Multi-Fit retainers.

| Description   | Part No. |
|---|----------|
| For 5/16" diameter Valve Stems $+.050''$ installed height (Yellow)  | 99102-1  |
| For 5/16" diameter Valve Stems standard height (Black)              | 99101-1  |
| For 5/16" diameter Valve Stems $-.050''$ installed height (Silver)  | 99100-1  |
| For 11/32" diameter Valve Stems $+.050''$ installed height (Yellow) | 99105-1  |
| For 11/32" diameter Valve Stems standard height (Black)             | 99104-1  |
| For 11/32" diameter Valve Stems $-.050''$ installed height (Silver) | 99103-1  |
| For 7 mm Valve Stems standard height (Black)                        | 99106-1  |
| For 8 mm diameter Valve Stems standard height (Black)               | 99107-1  |



## Multi-Fit Valve Stem Locks 10°

### Single Groove Design

Crane 10 degree heat treated, fully machined steel billet, Multi-Fit locks were designed to allow the retainer to have an increased cross-section in the critical area between the tapered hole for the locks and the valve spring steps. Having greater retainer integrity will now provide a more stable platform for the valve springs, reducing retainer breakage and the possibility of the locks separating from the valve stem under adverse operating conditions. Many competing 10 degree locks vary in production from 9 deg to 11-1/2 degree. Because of the accurate, robust design of Crane locks, they are incompatible with most competitors 10 degree retainers, and competitor's locks won't work with Crane Multi-Fit 10 degree retainers.

| Description   | Part No. |
|---|----------|
| For 5/16" diameter Valve Stems $+.050''$ installed height (Silver)  | 99072-1  |
| For 5/16" diameter Valve Stems standard height (Green)              | 99071-1  |
| For 5/16" diameter Valve Stems $-.050''$ installed height (Yellow)  | 99070-1  |
| For 11/32" diameter Valve Stems $+.050''$ installed height (Silver) | 99075-1  |
| For 11/32" diameter Valve Stems standard height (Green)             | 99074-1  |
| For 11/32" diameter Valve Stems $-.050''$ installed height (Yellow) | 99073-1  |
| For 3/8" diameter Valve Stems $+.050''$ installed height (Silver)   | 99078-1  |
| For 3/8" diameter Valve Stems standard height (Green)               | 99077-1  |
| For 3/8" diameter Valve Stems $-.050''$ installed height (Yellow)   | 99076-1  |



## Machined Steel Locks 10° Conventional

### Single Groove Design

Many engine builders are used to a conventional 10° taper, and these machined steel locks are perfect for any racing application where the conventional 10° design is specified. (Use only w/ **99630, 99631, 99632, 99633, 99634, 99638, 99639, or 99640** Crane retainers or competitors' conventional 10° retainers). Locks are recessed for lash cap clearance.

| Description   | Part No. |
|---|----------|
| For 5/16" diameter Valve Stems $+.050''$ installed height (Yellow)  | 99109-1  |
| For 5/16" diameter Valve Stems standard height (Black)              | 99080-1  |
| For 5/16" diameter Valve Stems $-.050''$ installed height (Silver)  | 99112-1  |
| For 11/32" diameter Valve Stems $+.050''$ installed height (Yellow) | 99110-1  |
| For 11/32" diameter Valve Stems standard height (Black)             | 99081-1  |
| For 11/32" diameter Valve Stems $-.050''$ installed height (Silver) | 99113-1  |
| For 3/8" diameter Valve Stems $+.050''$ installed height (Yellow)   | 99111-1  |
| For 3/8" diameter Valve Stems standard height (Black)               | 99082-1  |
| For 3/8" diameter Valve Stems $-.050''$ installed height (Silver)   | 99114-1  |



## Machined Steel Locks 10° Conventional

### Single Bead Design

| Description   | Part No. |
|---|----------|
| For 5/16" diameter Valve Stems $+.050''$ installed height (Yellow)  | 99118-1  |
| For 5/16" diameter Valve Stems standard height (Black)              | 99115-1  |
| For 5/16" diameter Valve Stems $-.050''$ installed height (Silver)  | 99121-1  |
| For 11/32" diameter Valve Stems $+.050''$ installed height (Yellow) | 99119-1  |
| For 11/32" diameter Valve Stems standard height (Black)             | 99116-1  |
| For 11/32" diameter Valve Stems $-.050''$ installed height (Silver) | 99122-1  |
| For 3/8" diameter Valve Stems $+.050''$ installed height (Yellow)   | 99120-1  |
| For 3/8" diameter Valve Stems standard height (Black)               | 99117-1  |
| For 3/8" diameter Valve Stems $-.050''$ installed height (Silver)   | 99123-1  |



# Valve Seals, Valve Train Accessories

## Hi-Performance Seals

(Machining Required)

Crane Cams valve stem seals provide maximum valve stem oil control. These seals wipe excess oil from the valve stem by means of a unique spring loaded wiper assembly, thus preventing unwanted oil from reaching and contaminating the cylinder. Machining usually required.

| Valve Stem Diameter | Guide O.D. | Seal O.D. | Part No. |
|---------------------|------------|-----------|----------|
| 5/16"               | .500       | .600      | 99825-16 |
| 5/16"               | .531       | .620      | 99824-16 |
| 11/32"              | .500       | .600      | 99826-16 |
| 11/32"              | .531       | .620      | 99820-16 |
| 8mm                 | .500       | .600      | 99818-16 |
| 3/8"                | .500       | .600      | 99828-16 |
| 3/8"                | .531       | .620      | 99822-16 |



## Valve Lash Caps

Precision machined from 8620 steel alloy, heat treated and black oxidized. Provides a better wear surface and lengthens valve for correct geometry. (Maintain .030" clearance from bottom of lash cap to top of the valve locks)

| Application  | Part No. |
|--|----------|
| 5/16" diameter valve stems (.162" tall, .060" thick)   | 99420-16 |
| 11/32" diameter valve stems (.162" tall, .060" thick)  | 99421-16 |
| 11/32" diameter valve stems, for Ford 2300 c.c. SOHC (.210" tall, .100" thick)                 | 99423-8  |
| 3/8" diameter valve stems (.162" tall, .060" thick)  | 99422-16 |
| 7mm diameter valve stems, for Ford 4.6-5.4L SOHC V-8 & 4.6L DOHC V-8 (.200" tall, .080" thick) | 99424-16 |
| 8mm diameter valve stems (.162" tall, .060" thick)   | 99425-16 |
| 8mm diameter valve stems, for Ford 2000 c.c. SOHC (.204" tall, .050" thick)                    | 99045-8  |



## Valve Spring Locators and Cups

Crane shatters the myth that "all spring seats are the same". Our new spring cups (those that contain the O.D. of the valve springs) and locators (that locate the I.D. of the valve springs) incorporate tapered vertical surfaces to eliminate the spring chafing that can quickly deteriorate and lead to premature failure and breakage of the most expensive valve springs. And when valve springs break, the damage is usually catastrophic. These heat-treated steel billet items are advised for applications ranging from street performance to professional racing. Available for specific applications, and most popular dimensioned valve springs. Don't chance your engine to an ordinary "spring seat".



| O.D.  | I.D. | Spring O.D. | Spring I.D.   | Base Thickness | Part No.  |
|---|------|-------------|---|----------------|-----------|
| <b>Locators</b>   |      |             |   |                |           |
| 1.240   | .505 | —           | .650<br>(for LS1/LS2/LS6 applications)              | .050           | 144460-16 |
| 1.290   | .512 | —           | .990  | .062           | 99456-16  |
| 1.290   | .578 | —           | .990  | .062           | 99457-16  |
| 1.290   | .640 | —           | .870  | .062           | 99468-16  |
| 1.290   | .640 | —           | .990  | .062           | 99458-16  |
| 1.295   | .570 | —           | .718<br>(for L98/Fast Burn alum. head applications) | .050           | 99467-16  |
| 1.480   | .640 | —           | .716  | .062           | 99455-16  |
| 1.500   | .570 | —           | .695  | .055           | 99465-16  |
| 1.500   | .570 | —           | .730  | .055           | 99460-16  |
| 1.558   | .570 | —           | .760  | .055           | 99466-16  |
| <b>Cups</b>   |      |             |   |                |           |
| 1.685   | .637 | 1.570       | —   | .062           | 99464-16  |
| 1.730   | .630 | 1.520       | —   | .300           | 99459-8   |
| (for eliminating rotators on Chevrolet 396-454-502 and 8.1L cylinder heads) |      |             |   |                |           |
| 1.745   | .637 | 1.630       | —   | .062           | 99463-16  |
| 1.745   | .637 | 1.650       | —   | .062           | 99461-16  |

## Valve Spring Shims

Durable steel shim stock, zinc plated for wear resistance.

| Description                               | Set Part No. |
|---|--------------|
| .015 x 1.480 x .703 (Hardened, set of 16) | 99050-1      |
| .015 x 1.640 x .635 (Hardened, set of 16) | 99046-1      |
| .030 x 1.480 x .703 (Set of 32)           | 99051-1      |
| .060 x 1.480 x .703 (Set of 32)           | 99052-1      |

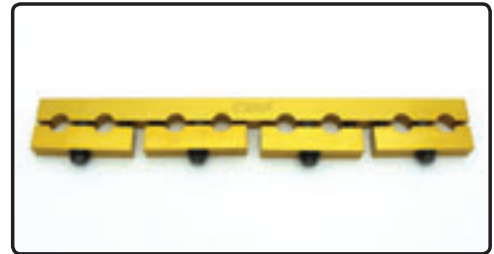


## Valve Train Stabilizers... Quick-Lock™ Stud Girdles

Crane Cams' Quick Lock Valve Train stabilizers are a unique approach to the now common use of stud girdles for racing engine applications. Most importantly, the Crane Quick-Lock unit slashes the time required for removal and replacement of the stabilizer unit to a fraction of the time other units require. Crane VTS bars are made from finest quality aluminum bar stock, machined to precise blueprint specifications and attractively gold anodized for corrosion resistance. Each Crane VTS comes complete with all necessary hardware including heat treated steel rocker arm adjusting nuts. They are easily installed and require no cylinder head machining or modifications for installation.

**(CAUTION: Added height of the Crane VTS requires the use of aftermarket tall valve covers)**

| Application   | Part No. |
|---|----------|
| <b>Chevrolet V-8 262 thru 400 cu.in. &amp; Pontiac-Brodix w/ standard rocker arm stud spacing</b> |          |
| For 3/8" rocker arm studs (99803 nuts included)   | 11600-1  |
| For .600" wide top slot rocker arms and 7/16" rocker arm studs (99810 nuts included)              | 11604-1  |
| <b>Chevrolet V-8 396 thru 454 (will not fit casting 14044861)</b>                                 |          |
| For .600" wide top slot rocker arms (99809 intake and 99810 exhaust nuts included)                | 13602-1  |
| <b>Ford V-8 370-429-460 cu.in.</b>  |          |
| For .600" wide top slot rocker arms and 7/16" rocker arm studs (99810 nuts included)              | 35602-1  |



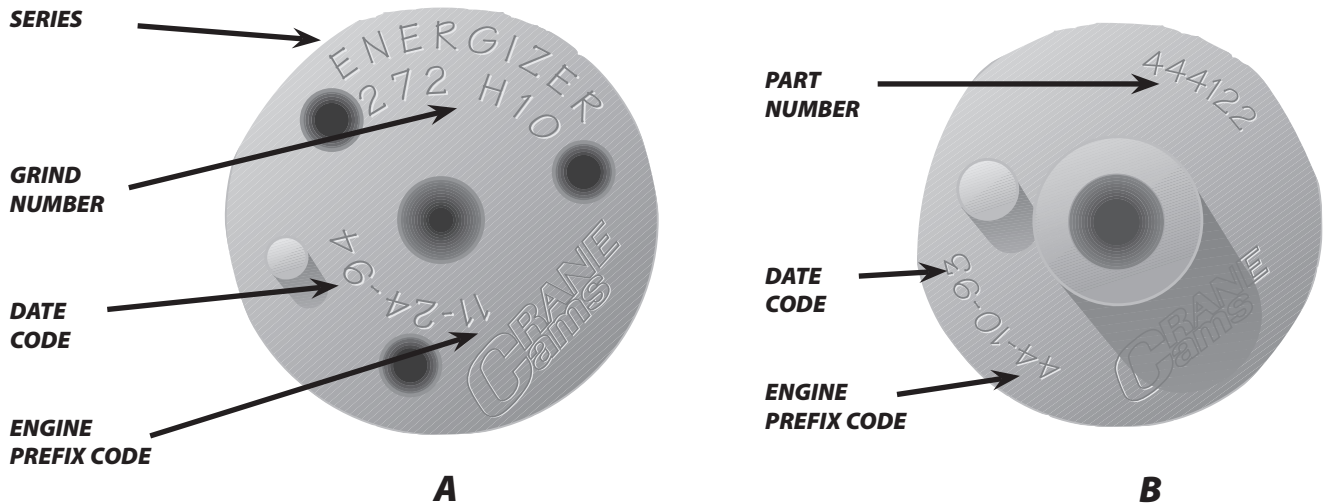
# Promotional Items

## Promotional Items

| Description   | Part No.   |
|---|------------|
| <b>Catalogs</b>                                     |            |
| Crane Cams Master Catalog                           | 99193-10   |
| Crane Cams Master Catalog on Disc                   | PP0112B    |
| Crane Cams Lobe Master Listing                      | PP0307A    |
| Crane Cams Ignition Catalog                         | 106-5890   |
| Crane Cams Ignition Catalog on Disc                 | PP1010A    |
| Crane Cams Motorcycle Catalog                       | PP0410B    |
| Crane Cams Motorcycle Catalog on Disc               | 510-0018   |
| <b>Decals - Contingency</b>                         |            |
| Crane Cams 11"                                      | 99174-1    |
| Crane Ignition 11"                                  | 99186-1    |
| <b>Decals and Patches</b>                           |            |
| Crane Cams 6" Decal                                 | 99189-1    |
| Crane Ignition 6" Decal                             | 99181-1    |
| Crane Cams 5" Patch                                 | 99209-1    |
| <b>Key Tags</b>                                     |            |
| Crane Cams White Tag with Red Logo                  | PP0612B    |
| <b>Banners and Clings</b>                           |            |
| 36" x 60" Crane Cams Red on White Banner            | 99213-1    |
| 36" x 60" Crane Cams Ignition Red on White Banner   | 99214-1    |
| "Crane Cams Available Here" Cling                   | 99188-1    |
| <b>Caps</b>   |            |
| Crane Cams Black with White Logo                    | PP1010B    |
| <b>T-Shirts</b>                                     |            |
| Crane Cams Red Ringer—White with Red Logo—Small     | PP1300S    |
| Crane Cams Red Ringer—White with Red Logo—Medium    | PP1301M    |
| Crane Cams Red Ringer—White with Red Logo—Large     | PP1302L    |
| Crane Cams Red Ringer—White with Red Logo—X Large   | PP1303XL   |
| Crane Cams Red Ringer—White with Red Logo—XX Large  | PP1304XXL  |
| Crane Cams Red Ringer—White with Red Logo—XXX Large | PP1305XXXL |
| Crane Cams Black with White Logo—Small              | PP1310S    |
| Crane Cams Black with White Logo—Medium             | PP1311M    |
| Crane Cams Black with White Logo—Large              | PP1312L    |
| Crane Cams Black with White Logo—X Large            | PP1313XL   |
| Crane Cams Black with White Logo—XX Large           | PP1314XXL  |
| Crane Cams Black with White Logo—XXX Large          | PP1315XXXL |
| Crane Cams White with Black Logo—Small              | PP1350S    |
| Crane Cams White with Black Logo—Medium             | PP1351M    |
| Crane Cams White with Black Logo—Large              | PP1352L    |
| Crane Cams White with Black Logo—X Large            | PP1353XL   |
| Crane Cams White with Black Logo—XX Large           | PP1354XXL  |
| Crane Cams White with Black Logo—XXX Large          | PP1355XXXL |
| Crane Cams White with Black Logo—XXX Large          | PP1356XXXL |



# How to Identify Your Crane Cam



The above illustrates an easy method for identifying some of the most popular Crane camshafts. To use this, you must first view the end of the camshaft. (Some Crane and Cam Dynamics cams for thrustplate equipped engines are marked on the opposite end of that shown here.) Make note of the two digit engine prefix code number, the series name, and the grind number.

For example, the two cams listed above would be:

**A** Engine Code – 11  
 Series – Energizer  
 Grind Number – 272 H10  
 (Part Number – 10005)

**B** Engine Code – 44  
 Part Number – 444122  
 Grind Number – 2030

NOTE: There are many more camshafts made by Crane Cams than are shown in this catalog. If you cannot find your particular cam, write down all the information (on "both" ends of the camshaft) and contact one of our Performance Consultants. Fax or write us, Crane Cams, 1640 Mason Ave., Daytona Beach, FL 32117, Fax 386-236-9983.

|                                      |  |   |  |
|--------------------------------------|--|---|--|
| PART NUMBER: 113801                  |  | POWERMAX HYDRAULIC                          |  |
| GRIND: H-278-2                       |  | V-8 262 THRU 400 CULIN.                     |  |
| ENGINE IDENT: 1957-1987 CHEVROLET    |  | 1957-1987 CHEVROLET V-8 262 THRU 400 CULIN. |  |
| BRACKET RACING, 3200-3800 CRUISE RPM |  | MILD  |  |
| VALVE SETTING: INTAKE .500           |  | EXHAUST .500                                |  |
| ROCKER ARM RATIO 1.5                 |  | VALVE 487                                   |  |
| INTAKE @ CAM 3114                    |  | EXHAUST @ CAM 3204                          |  |
| CAM THROTTLE .094                    |  | ADVERTISED DURATION 278 °                   |  |
| TAPPET                               |  | CLOSURE 280 °                               |  |
| INTAKE OPENS 26 BTDC                 |  | EXHAUST CLOSURE 72 ABDC                     |  |
| INTAKE OPENS 80 BBDC                 |  | EXHAUST CLOSURE 30 ATDC                     |  |
| SPRING REQUIREMENTS                  |  | RECOMMENDED SPRING                          |  |
| INPL: 99848                          |  | OUTER: 5700                                 |  |
| PART NUMBER 105                      |  | BS @ 1.700 OR 1.45/84                       |  |
| LOADS: CLOSED 280                    |  | OPEN 115 @ 1.240                            |  |
| CAM TAPPET                           |  | INTAKE OPENS 2 BTDC                         |  |
| TAPPET                               |  | EXHAUST CLOSURE (2) BTDC                    |  |
|                                      |  | MAX LIFT 109                                |  |
|                                      |  | DURATION 234 °                              |  |

## Need Cam Spec Card Info?

Find it FAST at:

[cranecams.com](http://cranecams.com)

For information on reading and understanding Cam Spec Cards, see page 385.

# Custom Ground Cams

## Custom Ground Cams

Crane Cams offers custom designed and ground cams sold outright, when cam cores are available, or reground, with the customer providing the cam core. We have hundreds of different cam cores, cast (for flat face hydraulic and mechanical lifter applications) and steel roller (hydraulic roller and mechanical roller) cores for various cylinder blocks, heads, journal diameters, firing orders, etc. New cores are also constantly being added.

Each outright Crane custom-ground cam has its own unique part number. This includes your being able to reorder the exact same cam any time you wish to reorder. You won't need to restate the lobe profile, centerline, or other option specs. Just refer to the

Part Number shown in the upper left corner of your Crane Cam Timing Specs Card, or from your invoice. This nine or ten digit part number indicates the Crane engine prefix, basic type of cam and a numerical sequence per each type.

You can select lobes from our Cam Lobe Profile Catalog (Pt. No. **PP0307A**), or [cranecams.com](http://cranecams.com). The online listings are updated frequently, and are the most up-to-date listing available. Shown are only the most popular lobes, and there are tens of thousands of additional lobe profiles available. We also design and produce exclusive, proprietary lobe masters for our customers. Lobe separations can then be selected along with any other features

you desire. These include cam journal diameters, journal bearing types, rear accessory drives, distributor gear material, additional dowel pins, gun drilling, journal grooving, etc. Our Tech Services staff can provide guidance on any custom cam issues.

There are tens of thousands of existing part numbers for custom grinds that may already include your own choice of profiles. If so, we can supply the grind part number for ordering. On new orders, once the order has been submitted the part number will be assigned and the order processed. Pricing information is available directly from Crane Cams.

## Easy-Order Check List:

**1.** Choose the lobe profile you wish to have ground and the lifter type: **Hydraulic; hydraulic roller; mechanical ("solid"); or mechanical roller.** (See Lobe Master Catalog, Part No. **PP0307A** or [cranecams.com](http://cranecams.com), or call for a copy) For street performance cam applications use the recommendation form on Page 367.

**2.** Call Crane at: **866-388-5120 (FAX 386-236-9983)** Mon-Thur, 8:00-7:00, Fri 8:00-5:00). On regrind orders **call first** before sending us your cam core!

**3.** Give us your engine make, year and C.I.D., lobe profile info (intake and exhaust), lobe separation and particulars (small base circle, special drive, etc.).

**4.** Tell us your preferred return shipping method and **requested delivery date** (We normally ship UPS or FedEx).

**5.** If you're a Crane Cams Engine Builder or WD, give us your P.O. Number and Account Number plus any additional info you wish to provide.

## Here's Why Crane Should Be Your Custom-Grind Cam Source!

- Order outright when new cam cores are available, or "regrind" (customer provides suitable core).
- Hundreds of different cam cores available. 80,000+ grinds available and new profiles being constantly added.
- Cast (hydraulic and "solid" lifter cams); and Billet Steel (hydraulic roller and mechanical "solid" roller) cores available for most popular applications.
- New cores constantly added for new blocks, heads, journal diameters, firing orders, etc.
- Each Crane custom cam has **its own unique part number**, for easy reorder. Just **specify the part number** or your invoice number.
- Choose profiles (lobe shapes) from the **Crane Cam Lobe Profile Listing** (part number **PP0307A**), from the website [www.cranecams.com](http://www.cranecams.com), or modify Crane catalog grinds.

- All Crane Cams are designed using the latest generation computer software, tooled and manufactured using the industry's most accurate equipment!
- All custom Crane cams feature that world famous Crane "Lobe-To-Lobe, Cam-To-Cam" accuracy!
- We also design and produce **exclusive, proprietary** lobe designs (Confidential to you alone!).
- Additional special services include: Different journal diameters, firing orders, rear accessory drives, distributor gear material, additional dowel pins, gun drilling, journal grooving, etc.
- Shipping Methods: UPS, FedEx. 24 Hour turnaround available with Next-Day shipping.

**To Order:**  
**866-388-5120 FAX: 386-236-9983**  
**Mon-Fri. 8:00-5:00, EDT**





# Camshaft Regrinding and Special Camshaft Services

Most any combination of intake and exhaust profiles and lobe separation may be ordered. We suggest you consult with our technical staff for recommendations on the latest and best combinations. You may occur an additional \$100.00 net engineering charge for domestic pushrod engines, or an additional \$150.00 net engineering charge for other (foreign OHC, industrial, restoration, etc.) new "one off" cam grinds. Refer to our latest Cam Lobe Profile Catalog, or our website for lobe profile listings. Be certain to send a completely filled out Cam Profile Recommendation Form to insure prompt attention.

All prices include normal straightening, regrinding, and Parko lubrite treating (to retard wear) when applicable. Additional charges will apply for any special machining work that is required to regrind a customer's camshaft, such as removing gears, oil pump drives, end plugs, etc. or drilling, tapping, centering, etc. Each camshaft ground using normal Crane Cams tooling (or tooling available at the time of your order).

\*This product is applicable only to pre-1966 California and pre-1968 federally certified passenger cars. It is also applicable to non-emission controlled trucks and similar vehicles. It is not applicable or intended for use on any emission controlled vehicles operated on highways or roads.

## Regrinding Your Camshaft

| Engine Description  | Labor Part No. |
|---|----------------|
| Most single cylinder  | 98006*         |
| Most two cylinder - iron  | 98008*         |
| Most V2 SOHC - per pair   | 98009*         |
| Most 4 cylinder - iron  | 98007*         |
| Most 4 cylinder SOHC - iron                                       | 98003*         |
| Most 4 cylinder SOHC - steel                                      | 98004*         |
| Most 4 cylinder - 8620 steel (we cannot re-heat treat)            | 98002*         |
| Most 4 cylinder - 9310 steel (we cannot re-heat treat)            | 98002*         |
| Most 4 cylinder - 8620 steel - IR / HIR (we cannot re-heat treat) | 98078*         |
| Most 4 cylinder - 9310 steel - IR / HIR (we cannot re-heat treat) | 98078*         |
| Most 4 cylinder DOHC - 4 lobes per cam - per pair                 | 98083*         |
| Most 4 cylinder DOHC - 8 lobes per cam - per pair                 | 98082*         |
| Most 6 cylinder - iron  | 98057*         |
| Most 6 cylinder SOHC - iron                                       | 98079*         |
| Most 6 cylinder - 8620 steel (we cannot re-heat treat)            | 98059*         |
| Most 6 cylinder - 9310 steel (we cannot re-heat treat)            | 98059*         |
| Most 6 cylinder - 8620 steel - IR / HIR (we cannot re-heat treat) | 98063*         |
| Most 6 cylinder - 9310 steel - IR / HIR (we cannot re-heat treat) | 98603*         |
| Most V6 SOHC - per pair   | 98080*         |
| Most V6 DOHC - per set of 4                                       | 98081*         |
| Most V8 - iron  | 98001*         |
| Most V8 - 8620 steel (we cannot re-heat treat)                    | 98060*         |
| Most V8 - 9310 steel (we cannot re-heat treat)                    | 98060*         |
| Most V8 - 9310 large journal (we cannot re-heat treat)            | 98060*         |
| Most V8 - tool steel (we cannot re-heat treat)                    | 98084*         |
| Most V8 - 8620 steel - IR / HIR (we cannot re-heat treat)         | 98084*         |
| Most V8 - 9310 steel - IR / HIR (we cannot re-heat treat)         | 98084*         |
| Most V8 - slot hardface   | 98058*         |
| Most V8 - semi finished - iron                                    | 98090*         |
| Most V8 - semi finished - steel                                   | 98090*         |
| Most V8 SOHC - per pair   | 98012*         |
| Most V8 DOHC - per set of 4                                       | 98013*         |
| Most straight-8   | 98077*         |
| Most V10 - steel  | 98060*         |
| Most V12  | 98050*         |
| Most V12 SOHC - per pair  | 98065*         |
| Most V12 DOHC - per set of 4                                      | 98055*         |
| Most industrial/diesel  | 98053*         |

### **Finish Grind Crane Round Lobe Outright Steel Billet Camshaft** (Round lobe spool supplied by Crane Cams)

| Engine Description           | Labor Part No. |
|------------------------------|----------------|
| Most 4 cylinder - 8620 steel | 98062*         |
| Most 6 cylinder - 8620 steel | 98086*         |
| Most V8 - 8620 steel         | 98061*         |
| Most V8 - 9310 steel         | 98067*         |

### **Finish Grind Customer's Round Lobe Steel Billet Camshaft** (Copper plate, rough grind, heat treat and finish grind) (Round lobe spool supplied by customer)

| Engine Description   | Labor Part No. |
|--|----------------|
| Most 1 cylinder - 8620 steel   | 98070*         |
| Most 4 cylinder - 8620 steel   | 98071*         |
| Most 6 cylinder - 8620 steel   | 98072*         |
| Most 6 cylinder industrial/diesel - 8620 steel                           | 98048*         |
| Most 6 cylinder - 8620 steel, copper plate, rough grind, heat treat only | 98085*         |
| Most V8 - 8620 steel   | 98068*         |
| Most V8 - 9310 steel   | 98064*         |
| Most V8 - 8620 steel, copper plate, rough grind, heat treat only         | 98069*         |
| Most V8 - 9310 steel, copper plate, rough grind, heat treat only         | 98069*         |

### **Special Services**

| Engine Description                                | Labor Part No. |
|---|----------------|
| Copper plate customer's steel round lobe camshaft | 98098          |
| Drill and tap rear of cam for Sander drive        | 98089          |
| Grind cam bearing journals                        | 98076          |
| Groove cam bearing journal for oiling             | 98088          |
| Install 5/16" diameter dowel pin                  | 98087          |
| Gun Drill camshaft                                | 98096          |
| Grind gearfit step on front journal               | 98073          |
| Miscellaneous labor - per hour                    | 98111          |
| Ultra Pro Micro-finish camshaft                   | 98113          |

### **Cam Inspection Service**

| Engine Description   | Labor Part No. |
|--|----------------|
| Crane Cams offers a cam inspection service for customer's new, used or damaged camshafts. Cams are straightened and checked for conformance to original specifications and lobe-to-lobe variation using the same high accuracy inspection equipment used to check and verify our own precision camshafts. A computer generated report giving the results of the check is furnished and returned with the cam. Our large file of measured data and specifications of engine manufacturers and other cam manufacturers will permit us to verify original specifications on almost any profile. | 98014          |

**NOTE:** There will be an additional net charge of \$40.00 for grinding roller lifter camshafts WITHOUT base circle undercutting.

There will be an additional net charge of \$20.00 to straighten abnormally bent camshafts.

There will be an additional charge to crate camshafts in a wooden box for additional protection during shipment.

### **Procedure for Sending Camshafts for Regrinding**

Before shipping your camshaft, please directly contact Crane Cams for the assignment of a Return Goods Authorization (RGA) number. This is necessary for tracking your camshaft throughout our procedures. While in contact with our technical staff, have as much information as possible about your combination readily available, to assist in making the proper new grind choice, or to facilitate repairs. When shipping the camshaft to us, you must include your name, address, E-mail address and daytime phone number, along with your RGA number on the outside of the package. After receiving and inspecting your camshaft, we will contact you to verify the operations that will be performed, along with your method of payment.

# Other Engine Applications

Although the following engines are not listed in the Applications Section of this catalog, we can regrind your camshaft and provide most kit components. Some new camshaft cores are available. For specific information, contact Crane Cams at 866-388-5120.

## American Motors/Jeep

|                       |     |       |
|-----------------------|-----|-------|
| 155 cu.in (2.5 Litre) | I-4 | 84-92 |
| 4.0 Litre             | I-6 | 99-05 |

## Arias/Fontana/MBR

|            |     |       |
|------------|-----|-------|
| 2.5 Litre  | I-4 | 84-09 |
| 8.3 Litre  | V-8 | 85-09 |
| 10.0 Litre | V-8 | 85-05 |

## Buick

|               |     |       |
|---------------|-----|-------|
| 198-225       | V-6 | 62-67 |
| 231           | V-6 | 75-77 |
| 196-231-252   | V-6 | 78-86 |
| 3.3-3.8 Litre | V-6 | 87-94 |
| 248-263-320   | I-8 | 39-53 |
| 264-322       | V-8 | 53-56 |
| 364-401-425   | V-8 | 57-66 |
| 215           | V-8 | 61-63 |
| 300-340       | V-8 | 64-67 |
| 350           | V-8 | 68-80 |

## Cadillac

|                     |     |       |
|---------------------|-----|-------|
| 331-365-390         | V-8 | 49-62 |
| 390-429             | V-8 | 63-67 |
| 250 (4.1 L)-4.5-4.9 | V-8 | 82-94 |

## Chevrolet

|                 |                |       |
|-----------------|----------------|-------|
| 153             | I-4            | 62-71 |
| 2300cc SOHC     | I-4            | 71-75 |
| 2000cc DOHC     | Cosworth I-4   | 75-76 |
| 1800-2000cc     | I-4            | 82-93 |
| 216-235         | I-6            | 37-53 |
| 235-261         | I-6            | 54-62 |
| 292             | I-6            | 63-84 |
| 140-145         | Corvair 6 cyl. | 60-63 |
| 164             | Corvair 6 cyl. | 64-69 |
| 200-229         | V-6            | 78-84 |
| 262 (4.3 Litre) | V-6            | 85-91 |
| 3.4-3.5 Litre   | V-6            | ALL   |

## Chrysler, DeSoto, Dodge, Plymouth

|                       |              |       |
|-----------------------|--------------|-------|
| 1700cc                | I-4          | 78-83 |
| 2.2-2.5L OHC          | I-4          | 81-94 |
| 235-250-265           | Flathead I-6 | 37-54 |
| 218-230               | Flathead I-6 | 42-59 |
| 170-198-225           | I-6          | 60-85 |
| 3.9L                  | V-6          | 88-94 |
| 3.3L                  | 60° V-6      | 90-94 |
| 301-331-354           | V-8          | 51-56 |
| 276-291               | V-8          | 52-55 |
| 241-259-270           | V-8          | 53-56 |
| 330-341-345           | V-8          | 56-57 |
| 315-325               | V-8          | 56-58 |
| 392                   | V-8          | 57-58 |
| 277-301-303-318-326   | V-8          | 56-66 |
| 350-440 Single Bolt B | V-8          | 58-78 |
| 5.7 Litre R5P7        | V-8          | ALL   |
| Hemi 99 500           | V-8          | ALL   |

## Crosley

|           |     |       |
|-----------|-----|-------|
| 44 cu.in. | I-4 | 46-55 |
|-----------|-----|-------|

## Dart

|                     |     |     |
|---------------------|-----|-----|
| 500 5" bore spacing | V-8 | ALL |
|---------------------|-----|-----|

## Donovan

|     |     |     |
|-----|-----|-----|
| 417 | V-8 | ALL |
|-----|-----|-----|

Section Continued 



## Ford, Lincoln, Mercury

|                 |              |       |
|-----------------|--------------|-------|
| 1600cc          | I-4          | 71-80 |
| 1.6-1.9 Litre   | CVH I-4      | 81-93 |
| 2000cc SOHC     | I-4          | 71-74 |
| 2300-2500cc     | HSC I-4      | 85-93 |
| 215-223         | I-6          | 52-53 |
| 223             | I-6          | 54-64 |
| 262             | I-6          | 62-64 |
| 144-170-200-250 | I-6          | 60-83 |
| 2600-2800cc     | V-6          | 72-82 |
| 2800cc          | V-6          | 83-85 |
| 232             | V-6          | 82-84 |
| 3.0L            | V-6          | 86-94 |
| 4.5L SVO        | V-6          | 88-98 |
| 221             | Flathead V-8 | 32-41 |
| 239             | Flathead V-8 | 42-53 |
| 279-317-341-368 | V-8          | 52-57 |
| 256-272-292-312 | V-8          | 55-62 |
| 332-352-390     | V-8          | 58-62 |
| 383-410-430-462 | V-8          | 58-68 |
| 302 Boss        | V-8          | 69-70 |
| 427 SOHC        | V-8          | 63    |
| 429 Boss Hemi   | V-8          | 69-70 |

## GMC

|                 |     |       |
|-----------------|-----|-------|
| 224-248-270-302 | I-6 | 39-63 |
|-----------------|-----|-------|

## MG Midget - Sprite - Mini BMCA

|            |     |       |
|------------|-----|-------|
| 848-1275cc | I-4 | 57-84 |
|------------|-----|-------|

## Oldsmobile

|                   |     |       |
|-------------------|-----|-------|
| 2.3 L DOHC Quad 4 | I-4 | 88-96 |
| 2.3 SOHC Quad 4   | I-4 | 92-96 |
| 303-324           | V-8 | 49-55 |
| 324-371           | V-8 | 56-58 |
| 371-394           | V-8 | 59-64 |
| 215               | V-8 | 61-63 |
| 307               | V-8 | 85-90 |
| 330-400-425 45°   | V-8 | 64-67 |
| 500 DRCE2         | V-8 | ALL   |
| 500 DRCE3         | V-8 | ALL   |

## Pontiac

|                 |     |       |
|-----------------|-----|-------|
| 195             | I-4 | 60-63 |
| 151             | I-4 | 77-78 |
| 151 (2.5 Litre) | I-4 | 79-89 |
| 151 (2.5 Litre) | I-4 | 90-91 |
| 230-250 SOHC    | I-6 | 66-69 |
| 215             | V-8 | 61-63 |

## Rambler

|             |     |       |
|-------------|-----|-------|
| 250-287-327 | V-8 | 56-66 |
|-------------|-----|-------|

## Rodeck

|       |     |     |
|-------|-----|-----|
| 481x  | V-8 | ALL |
| 481x2 | V-8 | ALL |

## Rover

|                       |     |       |
|-----------------------|-----|-------|
| 215-3.5-3.9-4.2 Litre | V-8 | 68-00 |
|-----------------------|-----|-------|

## Studebaker

|                 |     |       |
|-----------------|-----|-------|
| 224-232-259-289 | V-8 | 51-64 |
|-----------------|-----|-------|



# Flat Tappet Camshaft Break-in Procedure

## Flat Tappet Camshaft Break-in Procedure

### **WARNING: NEW LIFTERS MUST BE INSTALLED WITH YOUR NEW CAMSHAFT**

#### **Prior to installation:**

- Check the compatibility of the camshaft with the remainder of the valve train components (valve springs, rockers, etc.)
- On race type, high spring load applications, use lighter load springs or remove the inner spring (dual spring application) just for break-in.

### **CRANE FLAT TAPPET CAMSHAFT RECOMMENDED BREAK-IN PROCEDURE**

Due to the EPA's mandate for zinc removal from most motor oils, proper flat tappet camshaft break-in procedure is more critical than ever before. This is true for both hydraulic and mechanical flat tappet camshafts. As a point of interest, the most critical time in the life of a flat tappet camshaft is the first 20 minutes of break-in during which the bottoms of the lifters "mate-in" with the cam lobes.

There are some oils with additive packages that are better for camshaft break-in. These include, but are not limited to: **Brad Penn or Joe Gibbs racing** or a "race only" petroleum-based oil, and include **Crane Cams Part # 99003-1 Super Lube** additive. **Do not use API rated SL, SM, or SN oil.**

**CAUTION:** We do not recommend the use of synthetic oils for break-in. Prior to installing the camshaft and lifters, it is recommended that the crankcase be drained and filled with new, clean oil, as listed above. The oil filter should also be changed at this time. Proper flat tappet camshaft break-in starts with the cam installation and includes the following steps:

1. Before installing the camshaft and lifters, wash them thoroughly in clean mineral spirits to remove the rust preventative that is placed on the cam before shipping. NOTE: As a rule of thumb, always thoroughly clean any part before installing it in an engine. Never assume that the parts are cleaned before packaging. During shipping, packaging material can rub into the component surface and must be removed.
2. DO NOT "pump-up" hydraulic lifters before use. This can cause the lifters to hold a valve open during engine cranking, which will cause low compression. The low compression will delay engine start-up and is very detrimental to proper camshaft break-in.
3. With the supplied moly paste lube, coat the bottom of the lifters, cam lobes and distributor gear. Use Crane Cams assembly lube Part # **99008-1** on all other surfaces and components.
4. Set your valve lash or lifter preload. Try to minimize the number of times that you rotate the engine, as this can displace the moly paste from the lobes and lifters.
5. If possible, prime the oiling system. When priming, rotate the engine at least two complete revolutions to assure oil gets to all valve train components. **Valve covers should be off to assure that all rockers are oiling.**
6. Preset the ignition timing to start the engine at a fast idle. **It is important that the static ignition timing is set as close as possible and if the engine has a carburetor, it should be filled with fuel. The engine needs to start quickly without excessive cranking to insure immediate lubrication to the cam lobes.**
7. Start the engine and immediately bring to 3,000 rpm. Timing should be adjusted, as quickly as possible, to reduce excessive heat or load during break-in. Get the engine running fairly smooth and vary the engine speed from 1500-3000 RPM in a slow, to moderate, acceleration/deceleration cycle. During this time, be sure to check for any leaks and check out any unusual noises. If something doesn't sound right, shut the engine off and check out the source of the noise. Upon restart, resume the high idle speed cycling. Continue the varying break-in speed for 20 - 30 minutes. This is necessary to provide proper lifter rotation to properly mate each lifter to its lobe. Should the engine need to be shut down for any reason, upon re-start it should be immediately brought back to 3000 rpm and the break-in continued for a total run time of 20 - 30 minutes.
8. **Let the engine cool, and then drain the crankcase and properly dispose of the oil and oil filter. Refill the crankcase with a premium petroleum-based oil, not a synthetic oil. At this point the initial break-in is complete. You can drive the vehicle in your normal manner. We recommend changing the oil and filter after 500 miles. You might want to put another 5000 miles on the cam before switching to a synthetic, if that is your preference.**

Section Continued 

## *Flat Tappet Camshaft Break-in Procedure (continued)*

### **ADDITIONAL INFORMATION**

**Spring Pressures:** For extended camshaft life, flat-tappet cams should not be run with more than the recommended open valve spring pressure. Racing applications will often need to run more spring pressure at the expense of reduced camshaft life. In order to break-in a camshaft with high open pressures, the inner springs should be removed to reduce break-in load. The inner springs can then be reinstalled after initial break-in is complete.

**Lifter Rotation:** Flat tappet cams (both hydraulic and mechanical) have the lobes ground on a slight taper and the lifters appear to sit offset from the lobe centerline. This will induce a rotation of the lifter on the lobe. This rotation draws oil to the mating surface between the lifter and the lobe. If it is possible to view the pushrods during break-in, they should be spinning as an indication that the lifter is spinning. If you don't see a pushrod spinning, immediately stop the engine and find the cause.

**Never use old flat tappet lifters on a new cam.** On flat tappet cams, the lobes and lifter bottoms mate together. If the lifters are removed from the engine, they must go back on the same lobe from which they were removed. **Crane Cams recommends the use of high quality lifters to prevent premature cam or lifter wear. Crane lifters are of the highest quality.**

Big Block Chevrolets have an oil-priming idiosyncrasy. When priming a Big Block Chevy with a drill motor and priming tool, it is often necessary to prime for as long as 20 minutes (while rotating the engine) to get oil to all of the lifters and rockers. It is advisable to prime these engines with the valve covers removed so you can check to see oil coming out of all of the rocker arms before firing the engine. This last step is advisable on all engines, but particularly on Big Block Chevrolets.

# Adjusting the Valve Train

## Hydraulic Lifters

Hydraulic lifters have been the choice of the automotive industry for many years for several good reasons. When compared to a mechanical lifter, the hydraulics are:

1. Quieter.
2. Low maintenance.
3. Able to adjust for thermal expansion of the engine.
4. Considered as a built in shock absorber, eases stress on valve train.
5. Capable of having a "Bleed Rate" that can be designed to accommodate different engine RPM ranges.

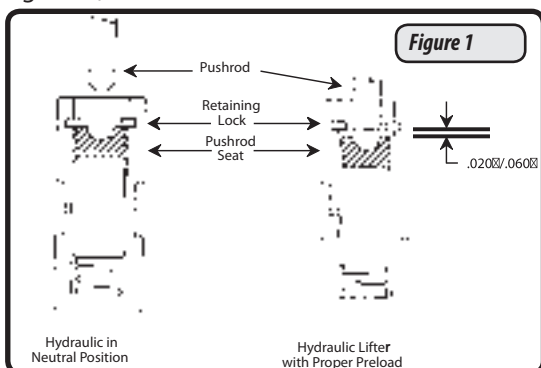
Most engines use either the standard design hydraulic lifter or the low friction, high performance hydraulic roller design. Hydraulic lifters are the best for street applications, high performance, and mild racing applications where low maintenance and low cost is a primary concern.

### What is the difference in the design of a Hydraulic and Mechanical Lifter?

Basically, the hydraulic lifter pushrod seat is moveable, the mechanical lifter seat is not. Both lifter types can look the same from the outside, with both usually having pushrod seats held in by a retaining lock. The pushrod seat in a mechanical lifter usually registers upon an internal step inside the lifter body preventing it from moving (thus it gets the nickname "Solid Lifter"). What's below the pushrod seat in the hydraulic lifter is a different story. Its pushrod seat is not restricted by a step, but instead sits on top of a moveable hydraulic mechanism which acts like a tiny hydraulic pump. Below this mechanism is valving, and a spring to produce an upward force, moving the pushrod seat upward against the retaining lock.

### What is Hydraulic Lifter Preload?

Mechanical cam designs require a running clearance or valve lash, while hydraulic lifters are just the opposite. When the rocker arm assembly is properly torqued down into position, the pushrod must take up all the clearance and descend into the hydraulic lifter, causing the pushrod seat to move down by .020" to .060". The distance that the pushrod seat moves down away from the retaining lock is the "Lifter Preload". The hydraulic mechanism requires this precise amount of "preload" for it to do its job properly. (See Figure 1.)



### What happens if the amount of Hydraulic Lifter Preload is wrong?

If clearance exists between the pushrod and the seat in the hydraulic lifter, after the rocker arm assembly has been torqued down, you will have no lifter preload. In this case the valve train will be noisy when the engine is running. All of the hydraulic force produced by the lifter will be exerted

against the lifter's retaining lock, and this could cause the lock to fail.

If the opposite occurs, and the pushrod descends too far (more than .060") with the lifter on the base circle, then you may have excessive lifter preload. In theory, a hydraulic lifter will only pump up to whatever preload it is set to. With excessive preload, as the engine RPM and oil pressure increases, the hydraulic mechanism could pump-up the pushrod seat if the valve spring cannot control the proper motion of the valve. This could cause the valve to stay off its seat during most of, or all, its entire cycle. This reduces the cylinder pressure, lowering the performance of the engine. Backfiring may also occur. The following sections will offer suggestions on how to correct this.

### When rebuilding an engine, what can cause Lifter Preload to change?

Almost anything can affect lifter preload. If you do a valve job, surface the block or heads, change the head gasket thickness, or buy a new camshaft, the amount of preload can be affected. Sometimes these changes cancel one another out and your preload stays the same; this is more by luck than design. This is why you must always inspect the amount of preload the lifter has when reassembling the engine and be sure that it is correct.

### A Fast and Easy Way to Check Hydraulic Lifter Preload when using Non-Adjustable Rocker Arms

With the cam, hydraulic lifters and pushrods in place, install your rocker arm assembly. Use the prescribed method in your repair manual and torque down all the valve train bolts in the proper sequence. Pick a cylinder that you are going to check. Hand rotate the engine in its normal direction of rotation until both valves are closed. You are on the compression cycle for that cylinder. (At this position the valve springs are at their least amount of tension making the job a little easier to do.) Wait a few minutes, allowing the lifters to bleed down. Now, lay a rigid straightedge across the cylinder head, supporting it on the surface of the head where the valve cover gasket would go. Using a metal scribe and the straightedge, carefully scribe a line on both pushrods. Now carefully remove the torque from all valve train bolts, removing any pressure from the pushrods. Wait a few minutes for the pushrod seat in the hydraulic lifter to move back to the neutral position. Carefully scribe a new line on both pushrods. Measure the distance between the two scribe marks, it represents the amount of lifter preload. If the lines are .020" to .060" apart you have proper lifter preload. If the lines are the same or less than .020" apart you have no, or insufficient, preload. If the lines are further apart than .060", you have excessive lifter preload. To bring your preload into tolerance, use one of the methods described in the next section if necessary, or call the Crane Tech Line for assistance (866-388-5120).

### Methods to Adjust for Proper Hydraulic Lifter Preload

There are several different methods for increasing or decreasing the amount of lifter preload, depending on valve train design and how the rocker arm is held onto the cylinder head. Keep in mind that the automotive manufacturers have made changes to the valve train over the years. What may work on one year's engine may not work for another, even though they are basically the same engine. There is one method that universally works on all these engines, change the pushrod length! Use a longer pushrod to



## Hydraulic Lifters (continued)

increase preload, a shorter to reduce preload. Crane offers various length pushrods, (see pages 306 through 309) and offers custom length pushrods (see page 305).

Many methods are illustrated throughout the catalog, here are a few of them:

- Custom length pushrods
- Bottleneck stud shims
- Bridge mount rocker arm shims
- Pedestal mount rocker arm shims
- Adjustable conversion rocker arm studs/kits
- "Kool Nut" adjusting nuts
- Guideplate and rocker arm conversion kits
- Adjustable rocker arms (both stud and shaft mounted)
- Replacement guideplates and studs

### Using Adjustable Rocker Arms to set Hydraulic Lifter Preload

The easiest method to arrive at proper lifter preload is when you have an engine with "Adjustable Valve Train". Unfortunately, since 1967 most domestic engines, with the exception of small and big block Chevrolets, have been made with non-adjustable rocker arms. The Crane Catalog shows you several ways of converting your engine to an adjustable rocker arm system. The following sections will describe how to set the preload with adjustable rocker arms.

### Hydraulic Lifters Can Be Adjusted at Any Engine Temperature

Since hydraulic lifters can compensate for thermal expansion of the engine, the adjusting can be done with the engine cold; hot adjustment is not necessary.

### Adjusting Hydraulic Lifters for Proper Preload

In order to adjust the preload, the lifter must be properly located on the base circle or "Heel" of the lobe. (See Figure 2.) At this position the valve is closed and there is no lift taking place. You will need to watch the movement of the valves to determine which lifter is properly positioned for adjusting.

1. Remove the valve covers, and pick a cylinder that you are going to set the preload on.
2. Hand rotate the engine in its normal direction of rotation and watch the exhaust valve on that particular cylinder. When the exhaust valve begins to open, stop and adjust that cylinder's intake rocker arm. (Why? Because when the exhaust valve is just beginning to open, the intake lifter will be on the base circle of the lobe, the correct position for adjusting the intake.)
3. Back off the intake rocker arm adjuster and remove any tension from the pushrod. Wait a minute or two for that hydraulic lifter to return to a neutral position. The spring inside the lifter will move the pushrod seat up against the retaining lock if you give it time to do so. (If you are installing brand new lifters they will be in the neutral position when they come in the box.)
4. Now spin the intake pushrod with your fingers while tightening down the rocker arm. When you feel a slight resistance to the turning of the pushrod, you are at "Zero Lash". Turn the adjusting nut down one half to one full turn from that point. Lock the adjuster into position. The intake is now adjusted properly.

5. Continue to hand turn the engine, watching that same intake. It will go to full open and then begin to close. When it is almost closed, stop and adjust the exhaust rocker arm on that particular cylinder. (Again, when we see the intake almost closed, we are sure that exhaust lifter is on the base circle of the lobe.) Loosen the exhaust rocker arm and follow the same procedure described before in steps 3 and 4 to adjust this rocker arm.
6. Both valves on this cylinder are now adjusted, and you can move on to your next cylinder and follow the same procedure again.

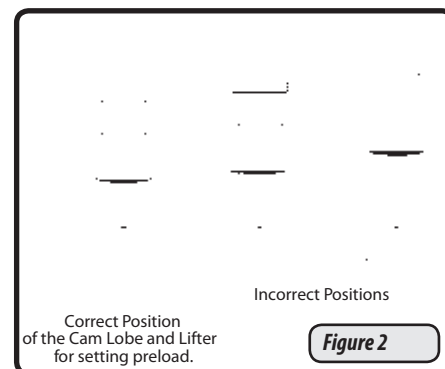
### Do Hydraulic Lifters Need to be Primed with Oil?

Many people mistakenly believe that hydraulic lifters must be soaked in oil overnight and be hand pumped up with a pushrod before installing into a new engine, however this is not necessary. In fact, this could cause the lifter to act as a "solid" and prevent obtaining proper preload. What is very necessary is the priming of the entire engine's oil system before starting up a new engine for the first time. This is done by turning the oil pump with a drill motor to force oil throughout the entire engine. Crane Cams offers oil pump primers for Chevrolet and Ford engines. (see page 331)

### What is a Hi Intensity Hydraulic Lifter?

Part of engineering a hydraulic lifter is to determine what its "Bleed Rate" will be. The "Bleed Rate" is a scientific method of determining the time it takes the hydraulic lifter to lose its pressure once it is fully pumped up solid with oil. By changing this rate, the lifter can give different performance factors to the engine. One such design is the Crane Cams Hi Intensity Lifter. Its increased bleed rate enables it to provide improved vacuum, increased cylinder pressure and performance in the lower RPM ranges. It is best suited for those engines that are using a big camshaft profile that requires more compression ratio than the engine actually has. This situation would normally cause a loss of bottom end performance, but with the Crane Cams Hi Intensity Lifter the bottom end torque is restored.

**NOTE: Hi Intensity Lifters are only for use if the compression ratio is below the recommended minimum shown on the application page for the particular camshaft you have selected. Otherwise higher than desired cylinder pressures may result, causing detonation.**



# Adjusting the Valve Train

## Mechanical Lifters

All pushrod engines using mechanical (solid) lifters, or mechanical roller lifters, must have an adjustable valve train so that precise adjustment for "Valve Lash" can be made to match the camshaft's requirements. Valve lash is the running clearance that exists between the tip of the valve stem and the valves mating surface of the rocker arm. (It is expressed in the Crane Catalog as "Valve Lash" and on the camshaft specification card as "Valve Setting". Both terms mean the same thing.) The amount of valve lash can vary between camshaft profile designs, being as small as .010" on some and as great as .035" on others. It is important to use the recommended valve lash when you first test the performance of the engine. You must also be concerned with thermal expansion of the engine components. This is especially true if using aluminum alloy cylinder heads, or block. For this reason, Crane requires that the valve lash be set with the engine "Hot" on all pushrod engines using mechanical lifters. This will insure that the minimum required clearance (valve lash) is maintained throughout the engine's operating temperature range.

### Compensating for a Cold Engine when Adjusting Valve Lash

When installing a new cam, the engine will be cold but the lash specifications are for a hot engine. What are you to do? There is a correction factor that can be used to get close. We mentioned that the alloy of the engine parts can be affected by thermal expansion in different ways, therefore the amount of correction factor to the lash setting depends on whether the cylinder heads and block are made out of cast iron or aluminum. You can take the "hot" setting given to you in the catalog or cam specification card and alter it by the following amount to get a "cold" lash setting.

- **With iron block and iron heads, add .002"**
- **With iron block and aluminum heads, subtract .006"**
- **With both aluminum block and heads, subtract .012"**

Remember this correction adjustment is approximate and is only meant to get you close for the initial start up of the engine. After the engine is warmed up to its proper operating temperature range, you must go back and reset all the valves to the proper "hot" valve lash settings.

### Setting Valve Lash on Mechanical Cams

All the valves must be set individually and only when the lifter is properly located on the base circle of the lobe. At this position the valve is closed and there is no lift taking place. How will you know when the valve you are adjusting is in the proper position with the lifter on the base circle of the cam? This can be accomplished by watching the movement of the valves.

1. When the engine is hot (at operating temperature) remove the valve covers and pick the cylinder that you are going to adjust.
2. Hand turn the engine in its normal direction of rotation while watching the exhaust valve on that particular cylinder. When the exhaust valve begins to open, stop and adjust that cylinder's intake valve. (Why? Because when the exhaust is just beginning to open, the intake lifter will be on the base circle of the lobe, so the intake is the one we can now adjust.)

3. Use a feeler gauge, set to the correct valve lash, and place it between the tip of the valve stem and rocker arm, unless otherwise specified. Adjust until you arrive at the proper setting and lock the adjuster in place.
4. After the intake valve has been adjusted, continue to rotate the engine, watching that same intake valve. The intake valve will go to full lift and then begin to close. When the intake is almost closed, stop and adjust the exhaust valve on that particular cylinder. (Again, when we see the intake valve almost closed, we are sure that the exhaust lifter is on the base circle of the lobe.) Use the feeler gauge and follow the procedure described before in step 3.
5. Both valves on this cylinder are now adjusted, so move to your next cylinder and follow the same procedure again. In the future you may find shortcuts to this method, but it still remains the best way to do the job correctly.

### Using Valve Lash to Help Tune the Engine

The engine only responds to the actual movement of the valves. Since the valve cannot move until all the running clearance (valve lash) has been taken up, the amount of valve lash you use affects the engine's performance. For example, if you decrease the amount of (hot) valve lash, the valve will open slightly sooner, lift higher, and close later. This makes the camshaft look bigger to the engine, because of a slight increase of actual running duration and lift. If you increase the amount of (hot) lash the opposite occurs. The valve will open later, lift less, and close sooner. This shows the engine a smaller cam with slightly less actual running duration and lift. You can use this method on a trial basis to see what the engine responds to and keep the setting that works the best. Just remember, the more lash you run, the noisier the valve train will be. If the clearance is excessive it can be harsh on the other valve train components. Therefore, for prolonged running of the engine we do not recommend increasing the amount of hot lash by more than +.004" from the recommended setting. Nor do we recommend decreasing the hot lash by more than -.008".

### Warning:

"Tight Lash" camshafts cannot deviate from the recommended hot lash setting by more than +.002" increase, or -.004" decrease. "Tight Lash" cams are those which have recommended valve settings of only .010", .012", or .014" on the specification card. These lobe designs have very short clearance ramps and cannot tolerate any increase in the recommended valve lash. The extra clearance can cause severe damage to valve train components.

With "Tight Lash" cams, we recommend using only the prescribed amount of hot valve lash, and that close inspection of the engine be maintained.

Please realize that changing valve lash settings from the recommended design specifications will change the harmonic characteristics of the valve train, possibly causing valve spring deterioration and breakage.

## Commonly Asked Valve Spring Questions

### What is Valve Spring Installed Height?

Installed height is the dimension measured from the bottom of the valve spring retainer, where the outer valve spring locates, to the spring pocket in the cylinder head, when the valve is closed. (See Figure 3)

### How Does Installed Height Affect the Spring Tension?

Installed height is the determining factor of what the valve spring "Closed Tension" will be. The camshaft specification card, and the spring section of the catalog both show what the approximate tension a particular valve spring will exert if installed at a specific height. For example, spring part no. **99848** shows 114# @ 1.700". This means that if this spring is installed at a height of 1.700" it should exert 114# of tension with the valve closed.

### How Do You Change Installed Height, and What Effect Does it Have?

The easiest way to lessen installed height is to insert a shim in the spring pocket below the valve spring. Another method is to use a different design valve spring retainer. Retainers with a deeper dish will have more installed height; with a shallower dish, less installed height. (See Figure 3) You can also use a valve lock that is designed to change the location where the retainer is positioned on the valve stem. For specific retainer or valve lock height specifications and options look in the Buyers Guide section of the catalog. Longer length valves can also be used.

The shorter the installed height, the higher the valve spring tension will be, and the less distance the spring can travel before reaching coil bind.

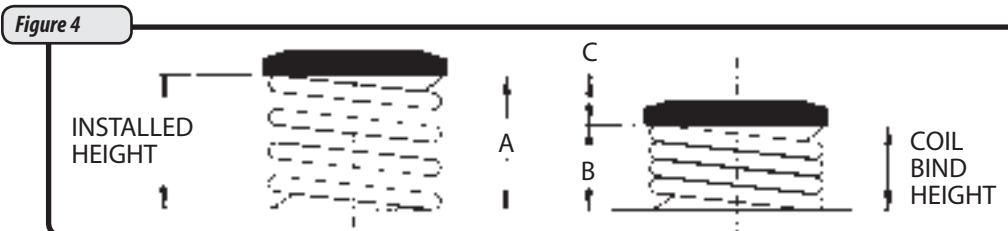
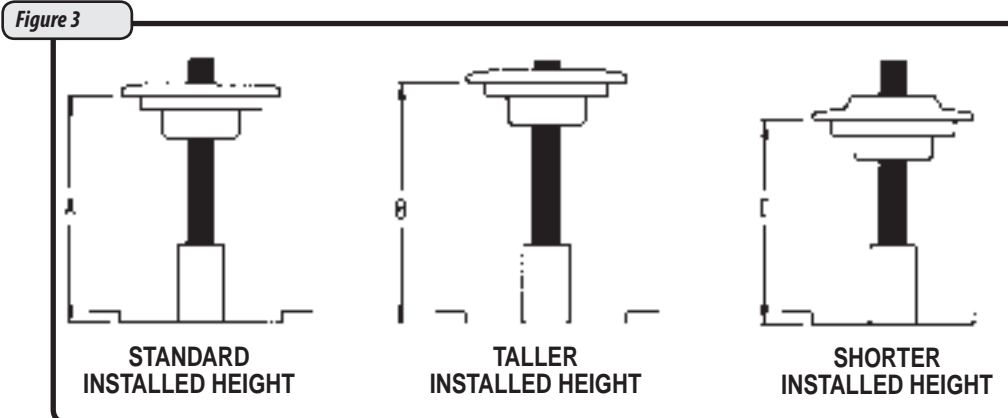
The taller the installed height, the less the valve spring tension and the further the spring can travel before coil bind occurs.

### What is Valve Spring Coil Bind and How Does it Relate to Spring Travel and Valve Lift?

When the valve spring is compressed until its coils touch one another and can travel no further, it is said to be in coil bind. The catalog (pages 337 to 339) shows the approximate coil bind height for the various Crane Cams valve springs. To measure this you must install the retainer in the valve spring, then compress the spring until it coil binds. Now measure from the bottom side of the retainer to the bottom of the spring. This measurement is the coil bind height. (See Figure 4) This can be done on the cylinder head with a spring compression tool, in a bench vise, or in a professional valve spring tester.

Using Figure 4, subtract the coil bind height "B" from the valve spring installed height "A". The difference "C" is the maximum spring travel. The spring travel should usually be at least .060" greater than the full lift of the valve. This safety margin of .060" (or more) is necessary to avoid the dangers of coil bind and over-stressing the spring.

If coil bind occurs, the resulting mechanical interference will severely damage the camshaft and valve train components.



Section Continued

# Commonly Asked Valve Spring Questions

## Commonly Asked Valve Spring Questions (continued)

### How Do You Increase the Spring Travel?

The valve spring must have sufficient travel (plus .060" safety margin) to accommodate the amount of valve lift created by the camshaft and/or an increase in rocker arm ratio. To increase spring travel you can either raise the installed height (but this will lessen the spring tension), or change to a spring with additional travel. If there is not a standard diameter spring available with enough travel, then the cylinder heads will have to be machined and a larger spring installed.

Crane Cams offers some special valve springs in standard diameters which saves you from having to machine the cylinder heads. For example, a small block Chevrolet engine can use spring kit part no. **11309-1** to handle .550" to .600" valve lift. The 85-00 302 Ford hydraulic roller engines can use spring kit part no. **44308-1** to handle .550" lift. Consult the Buyers Guide for specific spring information and options.

### Besides Coil Bind, What Other Types of Mechanical Interference Should You Look Out For?

When you increase the valve lift with a bigger cam or increased rocker arm ratio, you must be sure that there is no interference between any of the moving parts. Some of the components that must be inspected for clearance are:

1. Distance from the bottom of the valve spring retainer and the top of the valve stem guide (see Figure 5), or the top of the valve stem seal (see Figure 5), must be equal to the net valve lift of the valve plus at least .060" more for clearance.
  2. When using rocker arms mounted on a stud, the length of the slot in the rocker arm body must be inspected to be sure it is long enough to avoid binding on the stud. The ends of the slot must be at least .060" away from the stud when the rocker is at full valve lift and when the valve is closed.
- Crane Cams offers steel long slot and extra long slot rocker arms to relieve this interference problem. Aluminum roller rocker arms may be required to provide sufficient travel on larger lift camshafts.
3. The underside of the rocker arm body cannot touch the valve spring retainer. You will need at least .040" clearance to the retainer throughout the full movement of the rocker arm. If necessary, a different shape retainer or rocker arm design will be required. In some cases, installing a lash cap on the tip of the valve stem can provide the clearance required.
  4. Valve to piston clearance must be checked to be sure there is sufficient clearance. The intake valve must have at least .100" clearance to the piston and at least .120" clearance on the exhaust valve.

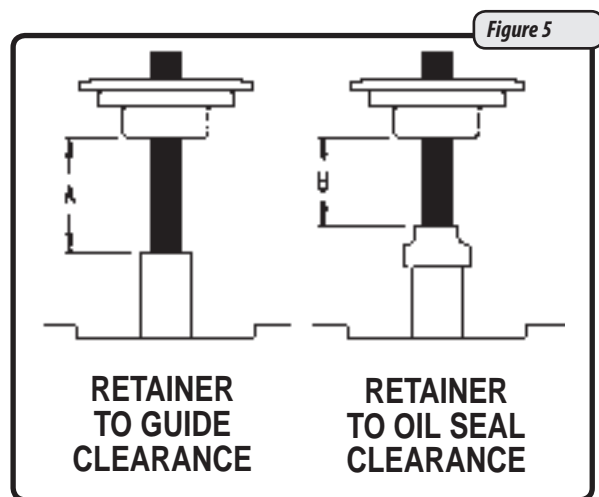
### What is a Quick Way to Check Valve to Piston Clearance on an Assembled Engine?

Low tension checking springs, part no. **99881-2**, must be used (instead of your normal valve spring) to mock up your valve train and to check the piston to valve clearance on the engine. Assemble the valve train and verify correct lifter preload or valve lash. By mounting a dial indicator on the cylinder head with the plunger's tip on the valve spring retainer, you can quickly check the clearance. Hand rotate the engine through a complete cycle (two rotations of the crankshaft), stopping at several points before and after Top Dead Center (T.D.C.) to check the valve clearance. The least amount of clearance will usually occur between 15 degrees before T.D.C. and 15 degrees after T.D.C. This also provides a graphic illustration that gross valve lift does not determine piston to valve clearance, as the piston is fairly far down in the cylinder when maximum valve lift is reached. By pushing the rocker arm down with your finger, the valve will contact the piston. The amount of movement shown on the dial indicator is the valve clearance at that point of engine rotation. Rotate the crankshaft a few degrees and re-check the clearance. As the piston moves through this area, the dial indicator reading will lessen, then become larger as you rotate the engine past the critical point. The shortest reading you get is the actual valve to piston clearance.

### What is the Critical Point of Crankshaft Rotation for Checking Valve to Piston Clearance?

The critical point for both valves is the "Overlap Period" as the exhaust cycle is ending and the intake cycle is beginning. You must start checking the clearance before and continue after T.D.C. on both the intake and exhaust valves to be sure you have the correct readings through the overlap period.

You can find all the tools required for checking valve to piston clearance (as well as degreasing a cam) in Crane Cams' Tune-A-Cam Kit, part no. **99030-1**.



Section Continued

## Commonly Asked Valve Train Questions

### **What is meant by Basic RPM?**

The camshaft's basic RPM is the RPM range within which the engine will produce its best power. The width of this power band is approximately 3000 to 3500 RPM with standard lifter cams, and 3500 to 4000 RPM with roller lifter cams. It is important that you select the camshaft with the "Basic RPM Range" best suited to your application, vehicle gearing and tire diameter.

### **Why is Cruise RPM at 60 MPH important?**

When selecting a new camshaft, you can raise or lower the engine's basic RPM range. It is important to be sure the vehicle's drive train is capable of matching your selection. The cruise RPM at 60 MPH is a way of rating your rear end gearing and tire diameter to determine if these components match the RPM potential you are desiring. You can use the formulas and chart on page 15 to calculate your cruise RPM.

### **What is Camshaft Duration and why is it important?**

Duration is the period of time, measured in degrees of crankshaft rotation, that a valve is open. Duration (at .050" lifter rise) is the deciding factor to what the engine's basic RPM range will be. Lower duration cams produce the power in the lower RPM range. Larger duration cams operate at higher RPM, but you will lose bottom end power to gain top end power as the duration is increased. (For each ten degree change in the duration at .050", the power band moves up or down in RPM range by approximately 500 RPM.)

### **What is the difference in Advertised Duration and Duration at .050" Lifter Rise (Tappet Lift)?**

In order for duration to have any merit as a measurement for comparing camshaft size, the method for determining the duration must be the same. There are two key components for measuring duration—the degrees of crankshaft rotation and at what point of lifter rise the measurements were taken. Advertised durations are not taken at any consistent point of lifter rise, so these numbers can vary greatly. For this reason, advertised duration figures are not good for comparing cams. Duration values expressed at .050" lifter rise state the exact point the measurement was taken. These are the only duration figures that are consistent and can accurately be used to compare camshafts.

### **How does Valve Lift affect the operation of an engine?**

Lift is the distance the valve actually travels. It is created by the cam lobe lift, which is then increased by the rocker arm ratio. The amount of lift you have and the speed at which the valve moves is a key factor in determining the torque the engine will produce.

### **What is Camshaft Lobe Separation and how does it affect the engine?**

Lobe separation is the distance (in camshaft degrees) that the intake and exhaust lobe centerlines (for a given cylinder) are spread apart. Lobe separation is a physical characteristic of the camshaft and cannot be changed without regrinding the lobes. This separation determines where peak torque will occur within the engine's power range. Tight lobe separations (such as 106°) cause the peak torque to build early in basic RPM range of the cam. The torque will be concentrated, build quickly and peak out. Broader lobe separations (such as 112°) allow the torque to be spread over a broader portion of the basic RPM range and shows better power through the upper RPM.

### **What are Intake and Exhaust Centerlines?**

The centerline of either the intake or exhaust lobe is the theoretical maximum lift point of the lobe in relationship to Top Dead Center in degrees of crankshaft rotation. (They are shown at the bottom of the camshaft specification card as "MAX LIFT.") The centerline of the cam can be moved by installing the camshaft in the engine to an advanced or a retarded position.

### **How does Advancing or Retarding the camshaft's position in the engine affect performance?**

Advancing the cam will shift the basic RPM range downward. Four degrees of advance (from the original position) will cause the power range to start approximately 200 RPM sooner. Retarding it this same amount will move the power upward approximately 200 RPM. This can be helpful for tuning the power range to match your situation. If the correct cam has been selected for a particular application, installing it in the normal "straight up" position (per the opening and closing events at .050" lifter rise on the spec card) is the best starting point.

### **Why is it necessary to know the Compression Ratio of an engine in order to choose the correct cam?**

The compression ratio of the engine is one of three key factors in determining the engine's cylinder pressure. The other two are the duration of the camshaft (at .050" lifter rise) and the position of the cam in the engine (advanced or retarded). The result of how these three factors interact with one another is the amount of cylinder pressure the engine will generate. (This is usually expressed as the "cranking pressure" that can be measured with a gauge installed in the spark plug hole.) It is important to be sure that the engine's compression ratio matches the recommended ratio for the cam you are selecting. Too little compression ratio (or too much duration) will cause the cylinder pressure to drop. This will lower the power output of the engine. With too much compression ratio (or too little duration) the cylinder pressure will be too high, causing pre-ignition and detonation. This condition could severely damage engine components. It is important to follow the guidelines for compression shown on the application pages of the catalog.

Section Continued

# Cam and Valve Train Questions

## Commonly Asked Valve Train Questions (continued)

### **How does Cylinder Pressure relate to the octane rating of today's unleaded fuel?**

In very basic terms, the more cylinder pressure we make the more power the engine will produce. But look out for the fuel! Today's pump gasoline cannot tolerate excessive cylinder pressures. About 165 PSI with iron cylinder heads and 180 PSI with aluminum cylinder heads are reasonable limits to adhere to. Remember, cylinder pressure is affected by the static compression ratio and the camshaft specifications (primarily the intake valve closing event). Excessive pressures will cause detonation, resulting in internal engine damage. Octane boosters, or a racing grade of fuel, may be required to avoid difficulties.

### **How does an increase in Rocker Arm Ratio improve the engine's performance?**

The lobe lift of the cam is increased by the ratio of the rocker arm to produce the final amount of valve lift. A cam with a .320" lobe lift using a 1.50:1 ratio rocker arm will have .480" valve lift (.320" x 1.50 = .480"). If you install rocker arms with an increased ratio of 1.60:1, with the same cam, the lift would increase to .512" (.320" x 1.60 = .512"). The engine reacts to the movement of the valve. It doesn't know how the increased lift was generated. It responds the same way it would as if a slightly larger lift cam had been installed. In fact, since the speed of the valve is increased with the higher rocker arm ratio, the engine thinks it has also gained 2° to 4° of camshaft duration. The end result is an easy and quick way to improve the performance of the existing cam without having to install a new one. See the Buyers Guide section for availability of increased ratio rocker arms. Remember, whenever you increase the valve lift, with either a bigger cam or larger rocker arm ratio, you must check for valve spring coil bind and for other mechanical interference. Please review the previous sections concerning these matters.

### **Must new (Standard Design) lifters always be installed on a new camshaft?**

YES! All new standard (flat-faced) hydraulic and mechanical camshafts must have new lifters installed. The face of these lifters do have a slight crown, and the mating lobe surface they ride on has been ground with a slight taper. The purpose of this is to create a "spinning" of the lifter as it rides on the lobe. This is necessary to prevent premature wear of the lifter and lobe. Therefore, these parts will be mated to one another during the initial break-in period. Used lifters will not mate properly, causing the lobe to fail.

If you are rebuilding an engine and plan to re-use the existing cam and lifters (in the same block) it can be done, as long as the lifter goes back on the same lobe it is mated to. To keep your components in order, a Crane Cams "Organizer Tray" part no. **99015-1** would be helpful. If the lifters get mixed up, they cannot be used, and a new set will be required. The new lifters would also have to go through the break-in procedure to mate to the old cam.

### **Can used Roller Lifters be installed on a new camshaft?**

**YES.** Roller lifters are the only ones that can be re-used. This design lifter has a wheel (supported by needle bearings) attached to the bottom of it. The lobe the roller lifter rides on does not have any taper. This is a very low friction design and does not require the lifter to mate to the cam. As long as the wheel shows no wear, and the needle bearings are in good condition, the hydraulic roller or mechanical roller lifter can be re-used.

### **What Engine Oil and Lubricants should I use?**

Crane Cams does not recommend the use of synthetic oils during the initial break-in period for a new camshaft. Use a good quality grade of naturally formulated motor oil during this period. If you choose to use synthetic oil after the engine has been broken in, change the oil filter and follow the oil manufacturer's instructions.

When using either regular oil or synthetic it is important to pick the weight oil that best matches your engine bearing clearances, the engine's operating temperature, and the climate the vehicle will be operating in. Use the oil manufacturer's recommendation to satisfy these conditions.

Crane Cams offers lubricants to aid during the critical break-in procedure, and to prolong the engine's life. See the Buyers Guide section, page 303, for specific information on Crane Cams Lubricants and their application.

### **Should I use Oil Restrictors in my engine?**

No, Crane Cams does not recommend the use of oil restrictors. The oil is the life blood of the engine, not only lubricating but cooling the engine components as well. For example, a valve spring builds in temperature as it compresses and relaxes. This increase of temperature affects the characteristics of the spring material, and if excessive, will shorten the life of the spring. Oil is the only means the spring has for cooling.

### **How do I prime the engine's oiling system?**

It is critical that the engine's oiling system be primed before starting the newly built, or rebuilt, engine for the first time. This must be done by turning the oil pump with a drill motor to supply oil throughout the engine. If this is done with the valve covers off, you will be able to see that the oil is being delivered to the top of the engine and to all the valve train components. Crane Cams offers oil pump primers for Chevrolet and Ford engines, see page 331.

### **What is the Most Important thing to remember?**

Reading and following the instructions supplied to you is most important. If there is something you don't understand, contact the people who supplied you the parts, or call one of the Crane Cams Technical Consultants. Get answers to your questions before proceeding.

**Any non-roller camshaft and lifters must be pre-lubricated before installation. Use Crane Cams Assembly Lube, part number 99002-1, and Crane Cams Super-Lube, part number 99003-1.**

## Degreeing the Cam

### **What is Meant by Degreeing the Camshaft, and Why is it Necessary?**

The term "Degreeing In Your Camshaft" means you are making sure the camshaft's position in the engine coincides with that of the crankshaft, so that their rotation is synchronized. This is the only way you will know if the rise and fall of the pistons properly matches the opening and closing of the valves, so the engine will run properly. A few degrees of misalignment can affect the engine's operation dramatically. If the circumstances were perfect, one would only need to line up the marks on the timing chain sprockets and the cam would be degreeed. In reality, you are dealing with a group of components (the camshaft, crankshaft, timing chain, and sprockets), all with their own standards and tolerances. If these tolerances stack up against you, it could throw you out of alignment. Without degreeing the cam you can never be sure that the parts are in correct position. If you have the tools and expertise, we always recommend that the camshaft's position in the engine be degreeed in.

### **Is There More Than One Way to Degree a Cam, and Which is Better?**

Currently there are two popular methods for degreeing a cam: the **centerline method**, and the **duration at .050" lift method**. We believe it is far better to degree the camshaft with either method than not to degree the cam at all; but of the two methods, the **duration at .050" lift is much more accurate**.

The main problem with the centerline method is it has you finding the theoretical centerline of the intake and/or exhaust lobe and line up on it. It makes the basic assumption that the lobe you are checking is symmetrical, with its opening side being the exact same shape and size as the closing side of the lobe. The truth is that most modern lobes are asymmetrical, with the opening side of the lobe being much more aggressive and the closing side being more gentle. Therefore, when you attempt to locate the middle (or centerline) of the asymmetrical lobe there is an automatic error factor. It could be as little as 2° off or as much as 6°, depending on the exact lobe shape and the procedure used during the degreeing operation. **Neither does it verify that the camshaft has been properly ground** with the correct duration lobes, which can drastically affect performance.

Since the duration at .050" lift method is not affected by the asymmetrical lobe design, we believe it is the more accurate way to degree.

### **What Tools Will I Need to Degree the Cam?**

The basic tools required are:

1. A degree wheel, such as Crane Cams part no. **99162-1**. You can also use a professional fully degreeed damper or hub, or install degree tape to your stock damper. Be sure to get the tape that matches the diameter of the damper. Use whatever will give you accurate markings for 360°.

2. A stable pointer that can be conveniently mounted to the engine.
3. A dial indicator with at least a half inch of travel in .001" increments. A rigid stand that mounts to the engine or with a magnetic base to hold the dial indicator will also be required.
4. A positive stop device to locate T.D.C. such as Crane Cams part no. **99410-1** or **99412-1** will be necessary. (You can make your own by using an old spark plug. Remove the porcelain insides, then drill and tap the interior of the spark plug housing and thread a long bolt through it.)

All of the above tools are in the Crane Cams Tune-A-Cam Kit, part no. **99030-1**.



**Tune-A-Cam Kit**

*Critical cam and valve train checking chores can be made easier, more accurate and faster when you have the correct tools handy. Crane Cams' Tune-A-Cam Kit, Part No. 99030-1, contains all the items required to degree-in your camshaft, check valve-to-piston clearance, etc. These items are all enclosed in their own foam protected, hard plastic carrying case.*

Section Continued

# Degreering the Cam

## Degreering the Cam (continued)

### How Do You Find Top Dead Center (T.D.C.)?

Determining exactly where Top Dead Center is can be tricky. The problem in finding the true T.D.C. of the piston's travel is that the piston dwells at T.D.C. for several degrees of crankshaft rotation. You must use a device to stop the piston in the same position on either side of T.D.C. and take readings from the degree wheel. You will then split the difference in these readings and move the pointer this amount, making it the true T.D.C. point.

Begin the procedure by first mounting the degree wheel on the end of the crankshaft securely, and rotating the engine to approximately T.D.C. Mount the pointer and line it up at zero on the degree wheel. Now rotate the engine to move the piston down into the cylinder. Install your positive stop device into the spark plug hole and extend the bolt. Now hand turn the engine (**do not use the starter motor or you will put a hole through the piston**), rotating it until the piston comes up and stops against the bolt. Look at the degree wheel and write down the number of degrees shown by the pointer. Hand turn the engine in the opposite direction until the piston comes up and stops on the bolt again. Go back to the degree wheel and write down the degrees it now reads. Add these two readings together and divide the answer by two. Now either move your pointer by this many degrees, or carefully loosen the degree wheel (without disturbing the position of the crankshaft) and move the wheel this required amount. Retighten the bolts, and rotate the engine again making sure that the readings on each side of T.D.C. are equal degrees away from zero. If they are, the zero on the degree wheel will now be the true T.D.C. point.

Be sure to remove the positive stop device from the spark plug hole, as this procedure is complete.

### A Simple Explanation of Cam Degreering

In simple terms, the degreering process can be thought of as using a dial indicator and degree wheel as tools to map out one revolution around the cam lobe. You will start on the base circle of the lobe where there is no lift. (See Figure 6) Then by rotating the engine you will move up the opening side, go over the top of the lobe, then move down the closing side, finishing back on the base circle. The dial indicator will move from zero, up to maximum lobe lift, then back to zero during this revolution. You will watch the dial indicator, and stop at two key points to take readings from the degree wheel. Both points will be when the dial indicator shows .050" of lifter rise. This .050" reading will occur on the opening side and again on the closing side of the lobe. These readings will then be compared to the specification card to see how close you are. If necessary, corrections can be made to put the camshaft in the exact position.

### Important Tips to Remember When Degreering a Camshaft

1. You must always **use the same type and size lifter that your camshaft was designed for**. For example, you cannot use a .842" diameter lifter on a camshaft designed for a .875" diameter lifter. You cannot use a standard (flat) lifter to degreer a roller camshaft. If your roller camshaft was designed to use a .920" diameter roller, it will not degreer properly with a .750" diameter roller, etc.
2. **Clean off any excessive lubricant** from the lobes and lifters that you are checking. Thick oil, especially assembly lube (paste) can cause false readings to occur. Wipe the parts clean before checking, and remember to re-lubricate them when you are finished.
3. If you make a mistake and rotate the engine past the point you wished to take a reading, **do not back up the rotation**. If you do, any slack in the timing chain or lash in the gears will affect the readings, causing an error. If you miss your stopping point, just continue rotating the engine in the normal direction until you return to the desired point.

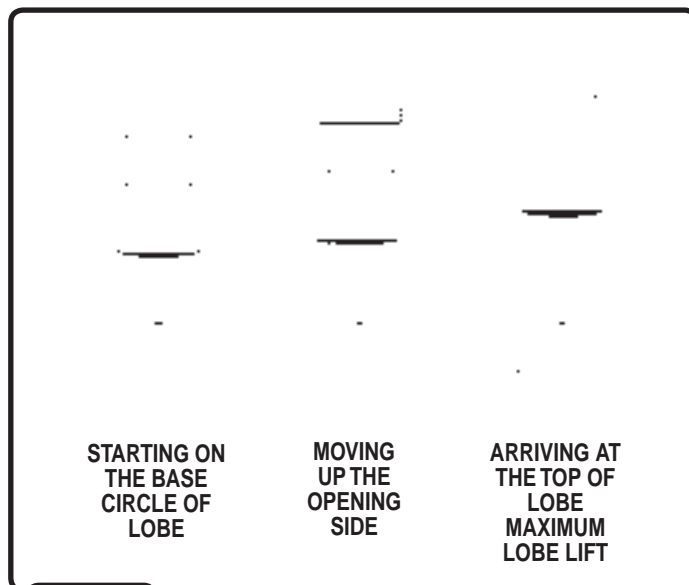


Figure 6

Section Continued 



## Degreeing the Cam (continued)

### The Procedure to Degree the Camshaft

1. The dial indicator and stand must be attached securely to the engine. Any deflection could cause an error in your readings. Using the number one cylinder as a starting point, hand rotate the engine in a normal direction (usually clockwise, when standing in front of the engine) until the intake valve is closed (the lifter is down on the base circle of the cam lobe). If the intake manifold is off the engine, mount the plunger of the indicator directly on top of the intake lifter itself. If the intake manifold is on the engine, you can use the pushrod as an extension to the dial indicator and mount the plunger tip directly on top of the pushrod. In either case, it is important to make sure the angle of the dial indicator plunger is the same angle as the lifter or pushrod travel. We want to read "straight line" (linear) movement of these parts, so the plunger must be aligned properly. With the indicator in position, set the dial indicator to zero.
2. Hand rotate the engine in its normal direction of rotation while watching the dial indicator. As the lifter starts to move up the opening side of the lobe, the reading on the dial indicator will start to increase. Continue rotating the engine until the dial indicator shows .050" of rise. Stop and take a reading on the degree wheel and write it down.
3. As you continue to rotate the engine, the reading on the dial indicator will rise up to the maximum lobe lift. The lifter is now on the top of the lobe. (The maximum lobe lift is shown on the spec card and can be verified at this point). Continue the rotation and the lifter will start down the closing side of the lobe. Carefully watch the dial indicator as the numbers descend. When the indicator descends back to the .050" reading, stop, take a reading from the degree wheel and write it down. Rotate the engine and return to the base circle of the lobe. **The dial indicator must read zero again to be sure the process was correctly done.**
4. You now have the two important readings from the degree wheel, both taken when the dial indicator read .050". One reading as the indicator was ascending on the opening side, the other when it was descending on the closing side. Compare these numbers to those on your camshaft inspection card to verify the position of the intake lobe. The camshaft specification card provides much information, but the numbers you are most interested in for the degreeing of the cam are at the bottom of the card. In the box identified as "Cam timing at .050" Tappet Lift". (Just a reminder, the word tappet and lifter mean the same thing. This can also be expressed as .050" lifter rise.) Inside this box are the degree readings that the degree wheel would show for the intake "opening" side of the lobe and the intake "closing" side of the lobe when the dial indicator is at .050" of lift. (Below those figures are the opening and closing figures for the exhaust.) Compare your readings for the intake to those on the card. If you're within a

degree, your camshaft is installed in the correct position. (See example of Specification Card on next page.)

5. You can follow exactly the same procedure on the exhaust lobe to determine its opening and closing degree points at .050" of tappet (or lifter) rise, and compare these readings to those on the specification card. If you also check the exhaust lobe you will have four points of reference (intake opening and closing, and the exhaust opening and closing) to go by. Remember, if you are within plus or minus one degree of these readings, your cam is in the correct location and will be synchronized to the crankshaft's rotation.

### What Can You Do If Your Camshaft is Off Of Location and Needs Correction?

There are several methods of adjusting the location of the camshaft to correct for misalignment. Most high performance timing chain sets have the lower crank sprocket machined with three or more keyways, allowing you to advance or retard the camshaft. There are also offset keys made for the crankshaft. Another popular method is offset eccentric timing bushings that can be installed in the upper camshaft sprocket to change the camshaft's position in relation to the sprocket on those camshafts that use a dowel pin for indexing. Use any of these methods, then degree the camshaft once again to be sure it is correct.

See the Buyers Guide section for degreeing bushings and performance timing chain sets.

# Cam Timing Explained

## Cam Timing Explained

Cam advance, lobe separation, lobe centerline, intake lobe centerline, etc. are all terms being used for comparing and devising camshaft specifications. With so many similar terms being used, there can be a bit of confusion when folks from different backgrounds start talking about them.

Lobe separation is the measurement in CAM degrees between the maximum lift point of the exhaust lobe to the maximum lift point of the intake lobe on any cylinder. Some also refer to this as lobe centerline. This dimension is ground into the camshaft and can not be changed by advancing or retarding the camshaft (unless it's an engine with separate intake and exhaust cams.)

Intake lobe centerline, or intake maximum lift, refers to the distance in crankshaft degrees from the cylinder's Top Dead Center point to the maximum lift point of the intake lobe on any one cylinder. This is usually measured as degrees After Top Dead Center. This figure WILL change when the cam is advanced or retarded. As you advance the cam, this number will get smaller, as you are opening it fewer degrees AFTER Top Dead Center. Retarding the cam will make this number larger, as you are opening it more degrees AFTER Top Dead Center.

Exhaust lobe centerline, or exhaust maximum lift, is usually expressed in crankshaft degrees Before Top Dead Center. As you advance the cam, this number will get larger, since you are opening it more degrees BEFORE Top Dead Center. Retarding the cam will make this number smaller.

The average of the intake lobe centerline and the exhaust lobe centerline should equal your lobe separation.

The cam timing figures (as measured at a specific lobe lift: .004", .020", .050", etc.) may show the maximum lift point to be distorted when you're dealing with non-symmetrical camshaft lobes (the opening side has a different shape than the closing side). If you split the difference between the opening and closing figures at .020" or .050" lobe lift, this figure will not coincide with the actual maximum lift point of the lobe. There are instances where a non-symmetrical intake lobe is paired with a symmetrical exhaust lobe (or vice-versa), or lobes with varying amounts of non-symmetry may be used as intake and exhaust. We believe that where the opening and closing events actually occur are the most important figures to pay attention to when degreeing your camshaft. Just finding the maximum lift points doesn't really tell you anything about the camshaft, or it's even the correct camshaft! By documenting the opening and closing numbers as you tune, you will gain more knowledge as to what actually helps or hinders your performance. This is also a good time to emphasize keeping track of your cranking compression whenever you change valve lash, cam timing, rocker arm ratio, and especially when changing camshafts.

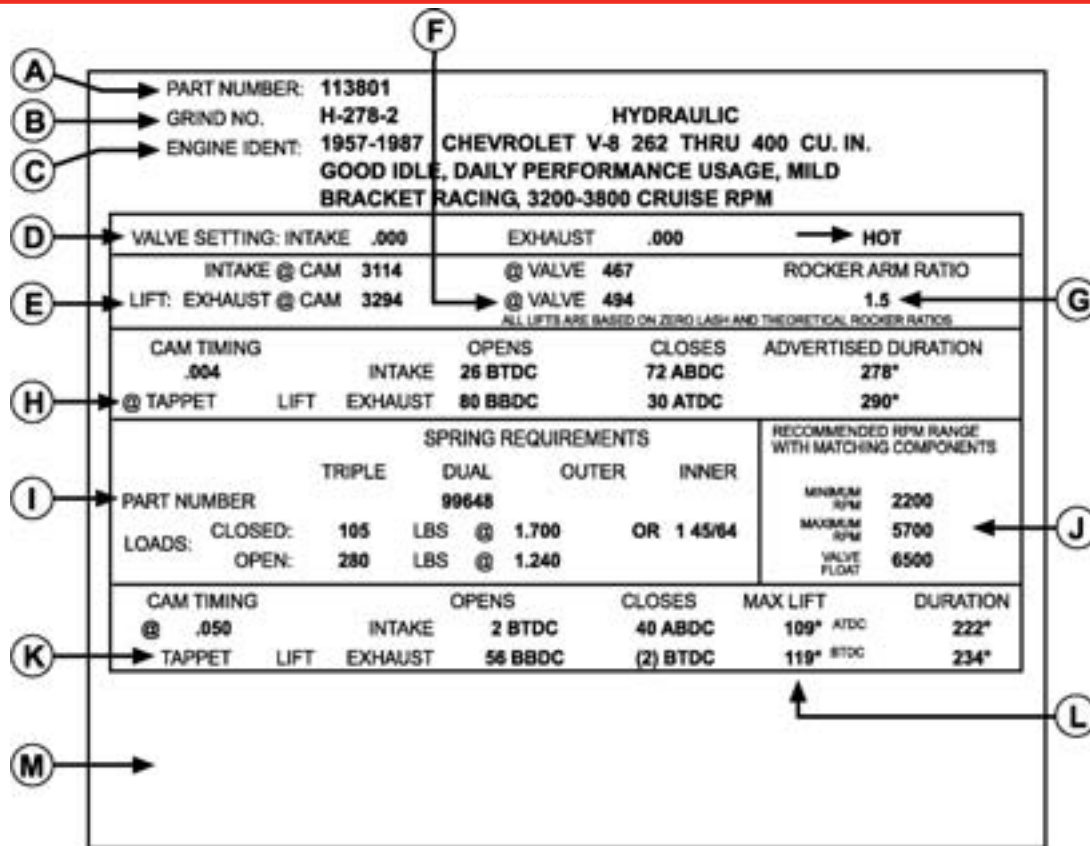
You may have noticed that most Crane Cams have a certain amount of advance ground into them when you check out the cam specification card. This is primarily done to insure that you have adequate torque to establish a good performance baseline. We have also found over the years, that the correct camshaft for most applications will run best with some amount of advance in it. We believe that it's certainly better to begin with too much bottom end and mid-range torque, and tune from there, than to have a shortage of torque, and try to figure out how to compensate for that.

The following is a general rule for how we grind most of our camshafts:

| Lobe Separation | Degrees Advance |
|-----------------|-----------------|
| Up to 102       | 0               |
| 103-104         | 2               |
| 105             | 3               |
| 106-107         | 4               |
| 108 or more     | 5               |

This has certainly not been a list of all of the terms and philosophies we use when producing our camshafts, but it will hopefully provide a bit of insight as to some of our methods of camshaft recommendation and production. We invite any questions or comments that you may have.

## Understanding the Cam Specification Card



- A. Part Number**
- B. Grind Number** refers to engineering design information only. (This is not a part number)
- C. Identification** of the engine series
- D.** Recommended **valve setting** for the particular cam shaft profile. This represents the running clearance or Valve Lash required. This setting is chosen for maximum performance and valve train reliability.
- E. Cam lobe lift** as measured at the lifter (tappet) with a dial indicator having .500 inch minimum travel capacity.
- F.** The **valve lift** data is determined by multiplying the cam lobe lift by the rocker arm ratio.
- G.** The **rocker arm ratio** listed is the engine manufacturer's standard specified (or otherwise recommended) ratio.
- H.** The **cam timing** events used to compute advertised duration. The opening and closing events, and at what lifter rise (tappet lift) they were taken, show how the **advertised duration** is calculated.
- I.** The **valve spring** requirements shown represent the maximum safe closed and open spring loads, and the most reliable valve springs for the camshaft profile and valve train combination.
- J.** **Recommended RPM** range is to be used as a guideline. This will vary depending on engine displacement and other equipment combinations.
- K.** **Cam timing** figures at .050" lifter rise (tappet lift) are provided for degreeding of the camshaft. They are expressed in degrees of crankshaft rotation. See pages 405-407 for additional degreeding information.
- L.** The **maximum lift** (centerline) figures shown represent the theoretical maximum lift points of the intake and exhaust lobe centerlines. Due to most modern cam lobe designs being asymmetrical, this may not be the actual point at which the centerline occurs. This figure is provided as a point of reference and **should not be used** to degree a camshaft.
- M.** When necessary, special instructions are provided at the bottom of the cam card.

Example:  
 26° B.T.D.C. Intake Opening  
 + 180° Crankshaft Rotation  
 + 72° A.B.D.C. Intake Closing  
 = 278° Advertised Duration

## ***Ignition Excellence***

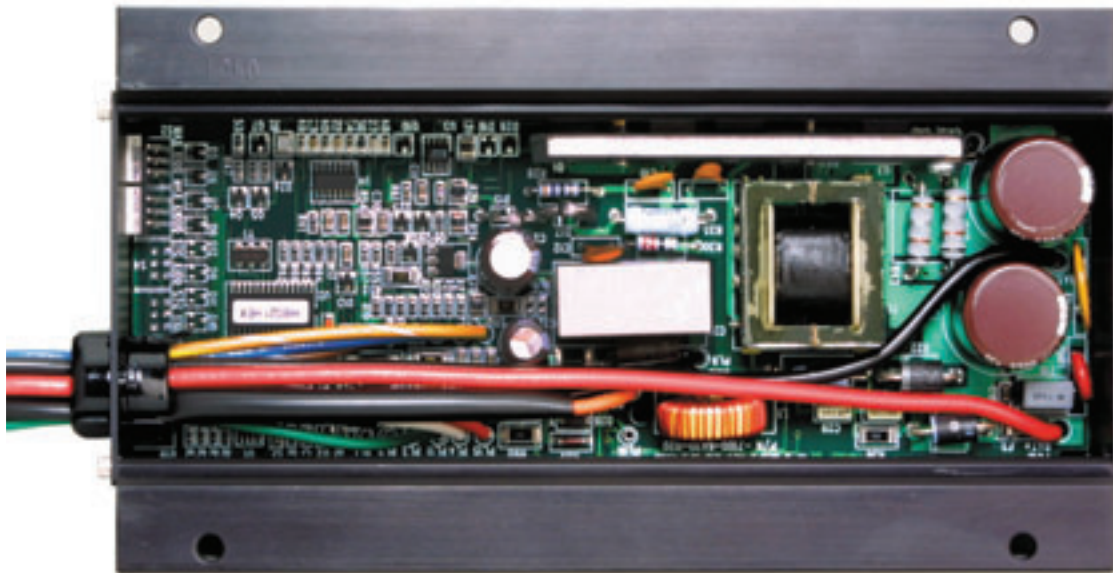
The Crane Cams Ignition product line is the most technologically advanced in the aftermarket ignition industry. Crane's ignitions and electronics are designed using the latest in cutting edge high technology, introducing unique and innovative products each year.

The Crane Cams Ignition line includes high output ignition for street performance, points replacements, drag racing, oval track racing, road racing, high output coils, distributors, and spark plug wire.

## ***Advanced Manufacturing Processes***

Crane Ignitions and accessories are manufactured using a highly automated process. Assembly is performed almost entirely using high speed automated equipment, far more accurate than it could be done by hand. Computer based test steps, again, a task that could not be done by hand effectively

Crane Ignitions are assembled using the finest quality grade components, automated manufacturing equipment, and the highest quality assurance to provide you with a product that is far superior in performance and reliability, at an affordable price.



## ***Powerful and Reliable!***

Crane Cams Ignition systems are tested in the lab and on the track as a proven ignition for daily street use or all out racing, where reliability is primary.

From the start, our engineers and technicians have been committed to designing systems that have the most current technology, the finest components, and the most advanced manufacturing processes. The result is a product line that makes us proud and performs for you.

## ***A Winning Future Begins Here for You...***

***Powered by Crane Cams Ignitions!***

|   |                |
|---|----------------|
| <b>HI-6S Multi-Spark/Inductive Ignition</b>       | <b>388-389</b> |
| <b>HI-6/Digital Multi-Spark CD Ignition</b>       | <b>390-391</b> |
| <b>HI-6R/Digital Multi-Spark CD Ignition</b>      | <b>392-393</b> |
| <b>HI-6TRC CD Ignition with Timing Retard</b>     | <b>394-395</b> |
| <b>HI-6DSR Dual Stage Rev Limiter CD Ignition</b> | <b>396-397</b> |
| <b>HI-6RC Digital CD Ignition for Oval Track</b>  | <b>398</b>     |
| <b>HI-6RN Digital CD Ignition for Oval Track</b>  | <b>399</b>     |
| <b>HI-6RL Digital CD Ignition for Oval Track</b>  | <b>400</b>     |
| <b>HI-6RC/HI-6RN Kits</b>                         | <b>401</b>     |
| <b>HEI Digital Module</b>                         | <b>402</b>     |
| <b>Timing Retard Control</b>                      | <b>403</b>     |
| <b>Hall Effect Crank Trigger</b>                  | <b>403</b>     |
| <b>Points Conversion Kits</b>                     | <b>404</b>     |
| <b>XR-i Points-to-Electronic Ignition</b>         | <b>405</b>     |
| <b>XR700 Points-To-Electronic Ignition</b>        | <b>406-407</b> |
| <b>XR3000 Points-To-Electronic Ignition</b>       | <b>408-409</b> |
| <b>Distributors</b>                               | <b>410-412</b> |
| <b>Coils</b>                                      | <b>413-417</b> |
| <b>Spark Plug Wires</b>                           | <b>418-420</b> |
| <b>Testers</b>                                    | <b>421</b>     |

# Street Performance, Trucks, Trailer-Towing, RV's

## HI-6S Multi-Spark/Inductive Ignition

- For 4, 6, 8 cylinder with distributor.
- Up to 70% more spark-gap energy than stock ignitions!
- Max output up to 8,000 RPM for up to 9.5:1 comp. ratio!
- Soft-urethane encapsulation seals against moisture, dirt, dust, vibration, heat!
- Points or module triggered.
- Built-in adj. rev limiter in 100 RPM increments from 3100-9900 RPM.
- Inductive ignition with long duration spark.
- Low cost boost retard (with optional MAP sensor) or 0-20° selectable nitrous retard.



### Applications

| Description   | Part No.         |
|---|------------------|
| <b>HI-6S Ignition-Only</b><br>For computer-controlled cars/trucks without vacuum advance. Triggers from stock electronic ignition. Not compatible with distributorless ignitions. 50 states legal <b>CARB E.O., D-225-59.</b>     | <b>6000-6300</b> |
| <b>HI-6S and Coil Kit – Ford Applications</b><br>HI-6S and PS-91 coil for 1985-95 Ford TFI-IV applications, including Mustang 5.0 H.O. Will not work with distributorless ignitions. 50 states legal <b>CARB E.O., D-225-59.</b>  | <b>6000-6301</b> |
| <b>HI-6S and PS91 Coil Kit – GM Applications</b><br>HI-6S and PS-91 coil for late model GM applications with dual plug coil (not LT-1). Will not work with distributorless ignitions. 50 states legal <b>CARB E.O., D-225-59.</b> | <b>6000-6302</b> |
| <b>HI-6S and LX91 Coil Kit – Universal Applications</b>   | <b>6000-6305</b> |

### Recommended Coils

| Description  | Part No.        |
|--|-----------------|
| LX91 E-Core Coil, Lightweight, Low-Profile, with Black Aluminum Bracket. | <b>730-0891</b> |
| PS91 E-Core Coil With Plated-Steel Bracket.                              | <b>730-0091</b> |
| PS60 Canister Style Coil.  | <b>730-0060</b> |

### Specifications

|                                |  |
|--------------------------------|--|
| <b>Operating voltage</b>       | 6 to 18v, reverse polarity protected, neg. ground  |
| <b>Current draw</b>            | 5.0 amps max. at 7,000 RPM   |
| <b>RPM operating range</b>     | 8,000 RPM (can be extended to 10,000 RPM on 4 cyl. engines).                               |
| <b>RPM limiter range</b>       | 3,100 to 9,900 RPM when digital stage rev limiter mode selected.                           |
| <b>Multiple Spark Duration</b> | Approximately 20 degrees crank shaft rotation below 2,000 RPM. Max 12 sparks per sequence. |
| <b>Primary voltage output</b>  | 450 volts (inductive discharge)  |
| <b>Spark duration</b>          | 2,800 microseconds at 2,000 RPM  |
| <b>Trigger input</b>           | Module trigger (12v square wave).  |
| <b>Dimensions</b>              | 5-1/2"L x 3"W x 1-1/2"H, 2-3/8 lbs.  |

## HI-6S Multi-Spark/Inductive Ignition

**A. TRC-2 Timing Retard Control (For Nitrous-Oxide, Supercharged, Turbo, Towing, RV, etc.)**

Driver adjustable 0-20 degree timing retard (not req. for HI-6S built-in retard modes). Three retard modes: continuous, demand and boost proportional. Mounts underdash.  
**Part No. 6000-6425**



A.

**B. MAP "Manifold Absolute Pressure" Sensor (2 Bar)**

Used as boost sensor for boost proportional retard with optional TRC-2 Timing Retard Control.

**Part No. 9000-0110**



B.

**C. Optical Trigger (Allows Use Of HI-6S on Points Distributor Models)**

Replaces breaker points and triggers HI-6S. Use HI-6S on pre-1975 vehicles, replacing stock breaker points, and some 1974-83 imports. 12 volt negative ground only. Requires separate installation kit.

**Part No. 715-0020**



C.



730-0891



730-0091



730-0060

# Street, Street Performance, Race

## HI-6/Digital Multi-Spark CD Ignition

- HI-6 (Pt. No. **6000-6440**) delivers higher spark-gap current\* than comparable digital CD ignitions!
- Multi-Spark CD, for race, street, up to 14.5:1 compression ratio, nitrous-oxide, super-charged and turbo. More HP, torque, crisper throttle response! For 4, 6, 8 cylinder with distributor.
- Bigger rotary switches with precise "Click-In" detents for easy rev limit adjustments. No "chips" needed. Adjusts in 100 RPM increments.
- Sequential rev limiting stops engine damaging "popping and banging" at rev limit.
- Built-in timing retard available with optional Control Module, Pt. No. **6000-6425**.
- Points, module, mag triggered.
- Fully potted with new, soft urethane for heat, dirt and moisture protection.
- Surface-mount, fully digital components. The most reliable CD ignition available.
- **CARB E.O., D-225-66**



### Specifications

|                         |  |
|-------------------------|--|
| Operating voltage       | 6 to 18v, reverse polarity protected, neg. ground only   |
| Current draw            | 7.0 amps max. at 10,000 RPM  |
| RPM operating range     | 12,000 RPM (with rev limiter disabled).  |
| RPM limiter range       | 600 to 9,900 RPM in 100 RPM increments.  |
| RPM limiter accuracy    | ±30 RPM  |
| Timing accuracy         | ±0.5 degrees from 500 to 9,900 RPM   |
| Multiple Spark Duration | 20 degrees crankshaft rotation below 3,000 RPM. Max 12 sparks per sequence with 1 millisecond interval between sparks. |
| Primary voltage output  | 450 volts  |
| Primary energy output   | 1200 millijoules/sequence  |
| Peak spark gap current  | 380 milliamps with LX91 coil, 510 milliamps with LX92 coil.  |
| Dimensions              | 8"L x 4-1/2"W x 2"H; 4-1/2 lbs.  |

### Applications

| Description   | Part No.  |
|---|-----------|
| HI-6 Capacitive Discharge Multi-Spark Ignition, black | 6000-6440 |
| HI-6 and LX92 Coil Kit - Universal Applications       | 6000-6445 |

### Recommended Coils

| Description   | Part No. |
|---|----------|
| LX92 E-Core Coil Lightweight, Low-Profile, with Black Aluminum Bracket. | 730-0892 |
| PS92 E-Core Coil With Plated-Steel Bracket.                             | 730-0092 |

**\*Must use Crane FireBall LX-92 coil Pt. No. 730-0892 for maximum ignition output.**



## HI-6/Digital Multi-Spark CD Ignition

### Optional HI-6 Accessories

- A. TRC-2 Timing Retard Control (For Nitrous-Oxide, Supercharged, Turbo, Towing, RV, etc.)**

Driver adjustable 0-20 degree timing retard. Three retard modes: continuous, demand and boost proportional. Mounts underdash.

**Part No. 6000-6425**

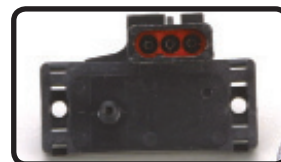


A.

- B. MAP "Manifold Absolute Pressure" Sensor (2 Bar)**

Used as boost sensor for boost proportional retard with optional TRC-2 Timing Retard Control.

**Part No. 9000-0110**

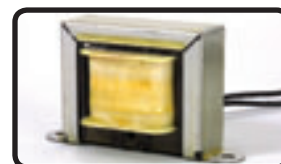


B.

- C. HI-6 Tach Adapter For Module Trigger Applications**

Required for some 1981-1995 non-OBD II applications triggering the HI-6 from the stock electronic ignition module. Connects to trigger input on HI-6 and feeds high voltage pulse required for tachometer and fuel injection control operation back into the stock engine control system.

**Part No. 6000-8910**



C.

- D. Optical Trigger (Allows Use Of HI-6 on Points Distributor Models)**

Replaces breaker points and triggers HI-6. Use HI-6 on pre-1975 vehicles, replacing stock breaker points, and some 1974-83 imports. 12 volt negative ground only. Requires separate installation kit.

**Part No. 715-0020**



D.



730-0892



730-0092

# Street, Street Performance, Race

## HI-6R/Digital Multi-Spark CD Ignition

- Multi-Spark CD, for race, street, up to 14.5:1 compression ratio, nitrous-oxide, supercharged and turbo. More HP, torque, crisper throttle response! For 4, 6, 8 cylinder with distributor.
- HI-6R (Pt. No. **6000-6400**) delivers higher spark-gap current\* than comparable digital CD ignitions!
- Built-in timing retard available with optional Control Module, Pt. No. **6000-6425**.
- "Plug-n-Go" universal harness included.
- Sequential rev limiting stops engine damaging "popping and banging" at rev limit.
- Bigger rotary switches with precise "Click-In" detents for easy rev limit adjustments. No "chips" needed. Adjusts in 100 RPM increments.
- Shock mounts included for race conditions.
- Points, Mag, or Module triggered.
- Fully potted with new, soft urethane for heat, dirt and moisture protection.
- Surface-mount, fully digital components. The most reliable CD ignition available.
- **CARB E.O., D-225-52**



### Applications

| Description                                      | Part No.  |
|--|-----------|
| HI-6R Racing CD Ignition                         | 6000-6400 |
| HI-6R and LX92 Coil Kit - Universal Applications | 6000-6405 |

### Recommended Coils

| Description   | Part No. |
|---|----------|
| LX92 E-Core Coil Lightweight, Low-Profile, with Black Aluminum Bracket. | 730-0892 |
| PS92 E-Core Coil With Plated-Steel Bracket.                             | 730-0092 |

### Specifications

|                         |   |
|-------------------------|---|
| Operating voltage       | 6 to 18 volts, reverse polarity protected, negative ground only   |
| Current draw            | 7.0 amps max at 10,000 RPM  |
| RPM operating range     | 12,000+ RPM (with rev limiter disabled).  |
| RPM limiter range       | 600 to 9,900 RPM in 100 RPM increments  |
| RPM limiter accuracy    | ±30 RPM   |
| Timing accuracy         | ±0.5 degrees from 500 to 9,900 RPM  |
| Multiple Spark Duration | 20° crankshaft rotation below 3,000 RPM. Maximum 12 sparks per seq. with 1 millisecond interval between sparks. |
| Primary voltage output  | 450 volts   |
| Primary energy output   | 1200 millijoules/sequence   |
| Peak spark gap current  | 380 milliamps with LX91 coil, 510 milliamps with LX92 coil  |
| Dimensions              | 8"L x 4-1/2"W x 2"H, 4-1/2 lbs  |

*\*Must use Crane FireBall LX-92 coil Pt. No. 730-0892 for maximum ignition output.*

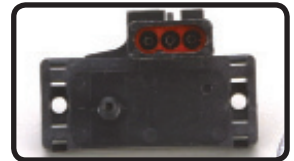
## HI-6R/Digital Multi-Spark CD Ignition

### Optional HI-6R Accessories

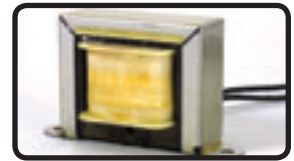
- A. TRC-2 Timing Retard Control (For Nitrous-Oxide, Supercharged, Turbo, Towing, RV, etc.)**  
Driver adjustable 0-20 degree timing retard. Three retard modes: continuous, demand and boost proportional. Mounts underdash.  
**Part No. 6000-6425**
- B. MAP "Manifold Absolute Pressure" Sensor (2 Bar)**  
Used as boost sensor for boost proportional retard with optional TRC-2 Timing Retard Control.  
**Part No. 9000-0110**
- C. HI-6R Tach Adapter For Module Trigger Applications**  
Required for some 1981-1995 non-OBD II applications triggering the HI-6R from the stock electronic ignition module. Connects to trigger input on HI-6R and feeds high voltage pulse required for tachometer and fuel injection operation back into the stock engine control system.  
**Part No. 6000-8910**
- D. Optical Trigger (Allows Use Of HI-6R on Points Distributor Models)**  
Replaces breaker points and triggers HI-6R. Use HI-6R on pre-1975 vehicles, replacing stock breaker points, and some 1974-83 imports. 12 volt negative ground only. Requires separate installation kit.  
**Part No. 715-0020**
- E. Shock/Vibration Mounts**  
To smooth out the ride for your ignition and coil (#10-32 thread). Set of 4.  
**Part No. 1000-1032**



A.



B.



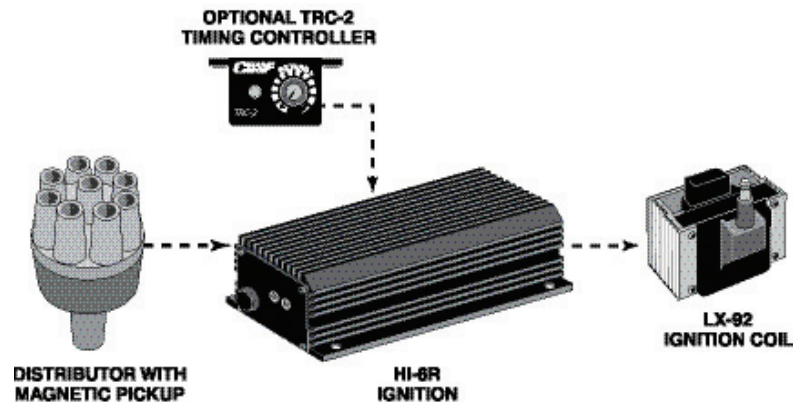
C.



D.



E.



# Street Performance, Race, Turbo

## HI-6TRC CD Ignition with Timing Retard

- 0-20° driver adjustable timing retard in under dash mount.
- Multi-Spark CD, for race or street, up to 14.5:1 compression ratio, nitrous-oxide, supercharged and turbo. More HP, torque, crisper throttle response! For 4, 6, 8 cylinder with distributor.
- HI-6TRC (Pt. No. **6000-6466**) delivers higher spark-gap current\* than comparable digital CD ignitions!
- Sequential rev limiting stops engine damaging “popping and banging” at rev limit.
- Bigger rotary switches with precise “Click-In” detents for easy rev limit adjustments. No “chips” needed. Adjusts in 100 RPM increments.
- Shock mounts included for race competition.
- Adapter harness included.
- Surface-mount, fully digital components. The most reliable CD ignition available.
- Fully potted with new, soft urethane for heat, dirt and moisture protection.
- Points, Mag, or Module triggered.
- **CARB E.O., D-225-49**



### Applications

| Description   | Part No.         |
|---|------------------|
| HI-6TRC Racing CD Ignition<br>Includes Part No's. <b>6000-6400</b> and <b>6000-6425</b> | <b>6000-6466</b> |

### Recommended Coils

| Description   | Part No.        |
|---|-----------------|
| LX92 E-Core Coil Lightweight, Low-Profile, with Black Aluminum Bracket. | <b>730-0892</b> |
| PS92 E-Core Coil With Plated-Steel Bracket.                             | <b>730-0092</b> |

### Specifications

|                         |   |
|-------------------------|---|
| Operating voltage       | 6 to 18 volts, reverse polarity protected, negative ground only   |
| Current draw            | 7.0 amps max at 10,000 RPM  |
| RPM operating range     | 12,000+ RPM (with rev limiter disabled).  |
| RPM limiter range       | 600 to 9,900 RPM in 100 RPM increments  |
| RPM limiter accuracy    | ±30 RPM   |
| Timing accuracy         | ±0.5 degrees from 500 to 9,900 RPM  |
| Multiple Spark Duration | 20° crankshaft rotation below 3,000 RPM. Maximum 12 sparks per seq. with 1 millisecond interval between sparks. |
| Primary voltage output  | 450 volts   |
| Primary energy output   | 1200 millijoules/sequence   |
| Peak spark gap current  | 380 milliamps with LX91 coil, 510 milliamps with LX92 coil  |
| Dimensions              | 8"L x 4-1/2"W x 2"H, 4-1/2 lbs  |

*\*Must use Crane FireBall LX-92 coil Pt. No. 730-0892 for maximum ignition output.*

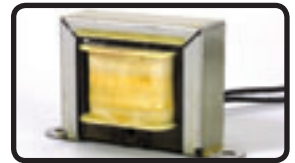
## HI-6TRC CD Ignition with Timing Retard

### Optional HI-6TRC Accessories

- A. MAP "Manifold Absolute Pressure" Sensor (2 Bar)**  
Used as boost sensor for boost proportional retard with optional TRC-2 Timing Retard Control.  
**Part No. 9000-0110**
  
- B. HI-6TRC Tach Adapter For Module Trigger Applications**  
Required for some 1981-1995 non-OBD II applications triggering the HI-6TRC from the stock electronic ignition module. Connects to trigger input on HI-6TRC and feeds high voltage pulse required for tachometer and fuel injection operation back into the stock engine control system.  
**Part No. 6000-8910**
  
- C. Optical Trigger (Allows Use Of HI-6TRC on Points Distributor Models)**  
Replaces breaker points and triggers HI-6TRC. Use HI-6TRC on pre-1975 vehicle, replacing stock breaker points, and some 1974-83 imports. 12 volt negative ground only. Requires separate installation kit.  
**Part No. 715-0020**
  
- D. Shock/Vibration Mounts**  
To smooth out the ride for your ignition and coil (#10-32 thread). Set of 4.  
**Part No. 1000-1032**



A.



B.



C.



D.



730-0892



730-0092



Compliment your Fire Power with Crane Cams' FireWire!

## HI-6DSR Dual Stage Rev Limiter CD Ignition

- Dual stage rev limiting from 600 to 9900 RPM!
- Bigger rotary switches with precise "Click-In" detents for easy rev limit adjustments. No "chips" needed. Adjusts in 100 RPM increments.
- HI-6DSR (Pt. No. **6000-6424**) delivers higher spark-gap current\* than comparable digital CD ignitions!
- Built-in timing retard available with optional Control Module, Pt. No. **6000-6425**.
- Multi-Spark CD, for race, street, up to 14.5:1 compression ratio, nitrous-oxide, supercharged and turbo. More HP, torque, crisper throttle response! For 4, 6, 8 cylinder with distributor.
- Sequential rev limiting stops engine damaging "popping and banging" at rev limit.
- Adapter harness included.
- Surface-mount, fully digital components. The most reliable CD ignition available.
- Fully potted with new, soft urethane for heat, dirt and moisture protection.
- Points, Mag, or Module triggered.
- **CARB E.O., D-225-63**



### Applications

#### Applications

| Description                                      | Part No.  |
|--|-----------|
| HI-6DSR CD Ignition with Dual Stage Rev Limiting | 6000-6424 |

#### Recommended Coils

| Description   | Part No. |
|---|----------|
| LX92 E-Core Coil Lightweight, Low-Profile, with Black Aluminum Bracket. | 730-0892 |
| PS92 E-Core Coil With Plated-Steel Bracket.                             | 730-0092 |

### Specifications

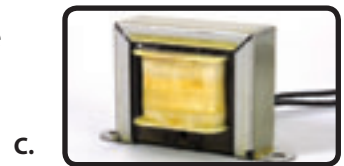
|                         |   |
|-------------------------|---|
| Operating voltage       | 6 to 18 volts, reverse polarity protected, negative ground only   |
| Current draw            | 7.0 amps max at 10,000 RPM  |
| RPM operating range     | 12,000+ RPM (with rev limiter disabled).  |
| RPM limiter range       | 600 to 9,900 RPM in 100 RPM increments  |
| RPM limiter accuracy    | ±30 RPM   |
| Timing accuracy         | ±0.5 degrees from 500 to 9,900 RPM  |
| Multiple Spark Duration | 20° crankshaft rotation below 3,000 RPM. Maximum 12 sparks per seq. with 1 millisecond interval between sparks. |
| Primary voltage output  | 450 volts   |
| Primary energy output   | 1200 millijoules/sequence   |
| Peak spark gap current  | 380 milliamps with LX91 coil, 510 milliamps with LX92 coil  |
| Dimensions              | 8" L x 4-1/2" W x 2" H, 4-1/2 lbs   |

*\*Must use Crane FireBall LX-92 coil Pt. No. 730-0892 for maximum ignition output.*

## HI-6DSR Dual Stage Rev Limiter CD Ignition

### Optional HI-6DSR Accessories

- A. TRC-2 Timing Retard Control (For Nitrous-Oxide, Supercharged, Turbo, Towing, RV, etc.)**  
 Driver adjustable 0-20 degree timing retard. Three retard modes: continuous, demand and boost proportional. Mounts underdash.  
**Part No. 6000-6425**
- B. MAP "Manifold Absolute Pressure" Sensor (2 Bar)**  
 Used as boost sensor for boost proportional retard with optional TRC-2 Timing Retard Control.  
**Part No. 9000-0110**
- C. HI-6DSR Tach Adapter For Module Trigger Applications**  
 Required for some 1981-1995 non-OBD II applications triggering the HI-6DSR from the stock electronic ignition module. Connects to trigger input on HI-6DSR and feeds high voltage pulse required for tachometer and fuel injection operation back into the stock engine control system.  
**Part No. 6000-8910**
- D. Optical Trigger (Allows Use Of HI-6DSR on Points Distributor Models)**  
 Replaces breaker points and triggers HI-6DSR. Use HI-6DSR on pre-1975 vehicle, replacing stock breaker points, and some 1974-83 imports. 12 volt negative ground only. Requires separate installation kit.  
**Part No. 715-0020**
- E. Shock/Vibration Mounts**  
 To smooth out the ride for your ignition and coil (#10-32 thread). Set of 4.  
**Part No. 1000-1032**



730-0892



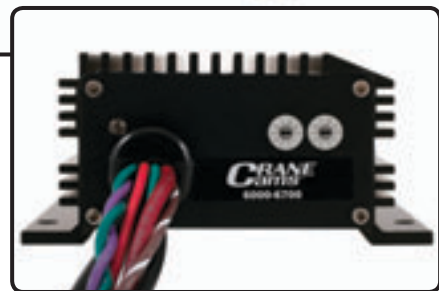
730-0092

# Oval Track, Race

## HI-6RC Digital CD Ignition

- Built-in 20 degree start retard feature, up to 600 RPM.
- Bigger rotary switches with precise “click-in” detents for easy rev limit adjustments. No “chips” needed.
- Adjusts in 100 RPM increments, 900–9,900 RPM.
- Shock mounts included for race conditions.
- Fully potted with new, soft urethane for heat, dirt and moisture protection.
- Surface-mount, fully digital components.
- The most reliable CD ignition available.
- Multi-Spark for quick, clean start up.
- CD (Capacitive Discharge) Ignition.
- Digital design for precise operation.
- Sequential rev limiter for longer engine life.

**Part Number 6000-6700**



### Specifications

|                         |   |
|-------------------------|---|
| Operating voltage       | 6 to 18 volts, reverse polarity protected, negative ground only   |
| Current draw            | 7.0 amps max at 10,000 RPM  |
| RPM operating range     | 12,000+ RPM (with rev limiter disabled).  |
| RPM limiter range       | 600 to 9,900 RPM in 100 RPM increments  |
| RPM limiter accuracy    | ±30 RPM   |
| Timing accuracy         | ±0.5 degrees from 500 to 9,900 RPM  |
| Multiple Spark Duration | 20° crankshaft rotation below 3,000 RPM. Maximum 12 sparks per seq. with 1 millisecond interval between sparks. |
| Primary voltage output  | 450 volts   |
| Primary energy output   | 1200 millijoules/sequence   |
| Peak spark gap current  | 380 milliamps with LX91 coil, 510 milliamps with LX92 coil  |
| Dimensions              | 8”L x 4-1/2”W x 2”H, 4-1/2 lbs  |

### Ignition Kit

| Description                             | Part No.   |
|---|------------|
| HI-6RC Ignition and Coil Kit (as shown) | 6000-6701  |
| Replacement Mounting Tray               | 6000-6363P |

### Recommended Coil

| Description       | Part No. |
|-------------------|----------|
| PS92N E-Core Coil | 730-0192 |

#### Approved for These Sanctioning Bodies:

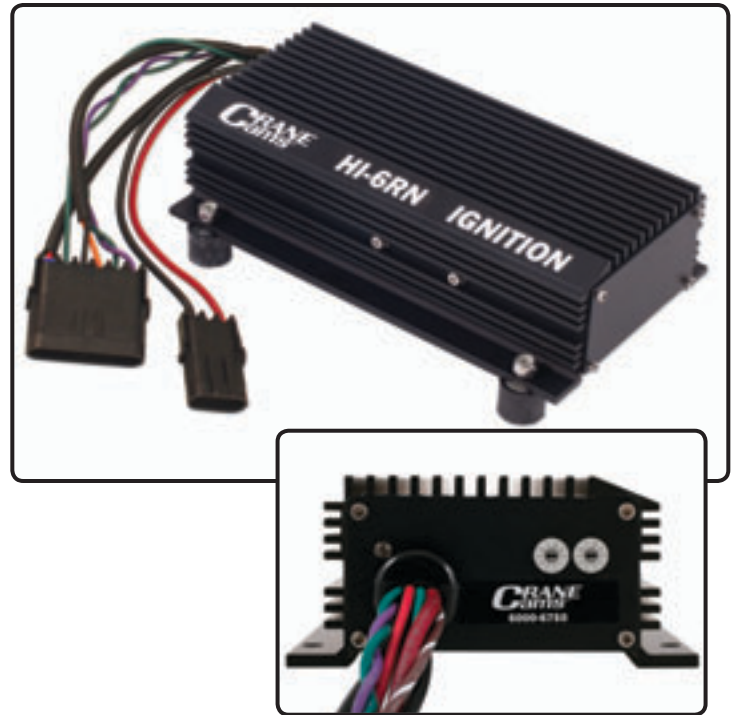
*American Modified Series, ARCA/CRA Super Series, ARCA Midwest Tour, Blizzard Series, JEGS/CRA All Star Tour, PASS, Snowball Derby, Southern Super Series, USMTS, USRA, WISSOTA Racing Series*



## HI-6RN Digital CD Ignition

- Multi-spark for quick, clean start-up.
- CD (Capacitive Discharge) Ignition.
- Digital design for precise operation.
- Sequential rev limiter for longer engine life.
- Bigger rotary switches with precise “click-in” detents for easy rev limit adjustments. No “chips” needed.
- Adjusts in 100 RPM increments, 900–9,900 RPM.
- Shock mounts included for race conditions.
- Fully potted with soft urethane for heat, dirt and moisture protection.
- Surface-mount, fully digital components.
- The most reliable CD ignition available. No need to run an extra ignition for backup.

**Part Number 6000-6750**



### Specifications

|                                |   |
|--------------------------------|---|
| <b>Operating voltage</b>       | 6 to 18 volts, reverse polarity protected, negative ground only   |
| <b>Current draw</b>            | 7.0 amps max at 10,000 RPM  |
| <b>RPM operating range</b>     | 12,000+ RPM (with rev limiter disabled).  |
| <b>RPM limiter range</b>       | 600 to 9,900 RPM in 100 RPM increments  |
| <b>RPM limiter accuracy</b>    | ±30 RPM   |
| <b>Timing accuracy</b>         | ±0.5 degrees from 500 to 9,900 RPM  |
| <b>Multiple Spark Duration</b> | 20° crankshaft rotation below 3,000 RPM. Maximum 12 sparks per seq. with 1 millisecond interval between sparks. |
| <b>Primary voltage output</b>  | 450 volts   |
| <b>Primary energy output</b>   | 1200 millijoules/sequence   |
| <b>Peak spark gap current</b>  | 380 milliamps with LX91 coil, 510 milliamps with LX92 coil  |
| <b>Dimensions</b>              | 8”L x 4-1/2”W x 2”H, 4-1/2 lbs  |

### Recommended Coil

| Description       | Part No. |
|-------------------|----------|
| PS92N E-Core Coil | 730-0192 |

#### Approved for These Sanctioning Bodies

*American Modified Series, ARCA/CRA Super Series, ARCA Midwest Tour, IMCA, JEGS/CRA All Star Tour, PASS, Snowball Derby, USMTS, USRA, WISSOTA Racing Series*

# Oval Track, Race

## HI-6RL Rev Limited Series

- Preset rev limiter in factory "sealed" unit, per sanction rules.
- Fully digital design since 1994.
- Multi-spark CD Ignition for fast start-up.
- Weatherpak® connectors.
- Magnetic trigger input.
- Tachometer input.
- LED light for power and trigger signal.
- Potted with soft urethane to seal from dirt, oil, moisture and vibration.
- Lightweight aluminum housing with cooling fins.



### Specifications

|                                |   |
|--------------------------------|---|
| <b>Operating voltage</b>       | 6 to 18 volts, reverse polarity protected, negative ground only   |
| <b>Current draw</b>            | 7.0 amps max at 10,000 RPM  |
| <b>RPM limiter accuracy</b>    | ±30 RPM   |
| <b>Timing accuracy</b>         | ±0.5 degrees from 500 to 9,900 RPM  |
| <b>Multiple Spark Duration</b> | 20° crankshaft rotation below 3,000 RPM. Maximum 12 sparks per seq. with 1 millisecond interval between sparks. |
| <b>Primary voltage output</b>  | 450 volts   |
| <b>Primary energy output</b>   | 1200 millijoules/sequence   |
| <b>Peak spark gap current</b>  | 380 milliamps with LX91 coil, 510 milliamps with LX92 coil  |
| <b>Dimensions</b>              | 8"L x 4-1/2"W x 2"H, 4-1/2 lbs  |

### Recommended Coil

| Description       | Part No. |
|-------------------|----------|
| PS92N E-Core Coil | 730-0192 |

### Applications

| Description             | Part No.  |
|-------------------------|-----------|
| HI-6RL (6300 Rev Limit) | 6000-6463 |
| HI-6RL (7400 Rev Limit) | 6000-6474 |
| HI-6RL (7600 Rev Limit) | 6000-6476 |
| HI-6RL (7800 Rev Limit) | 6000-6478 |
| HI-6RL (8000 Rev Limit) | 6000-8480 |
| HI-6RL (8400 Rev Limit) | 6000-8484 |

#### Approved for These Sanctioning Bodies

American Modified Series, ARCA/CRA Super Series, ARCA Midwest Tour, Blizzard Series, IMCA, JEGS/CRA, All Star Tour, PASS, Southern Super Series, USMTS, USRA, WISSOTA Racing Series

## HI-6RC/HI-6RN Complete Kits

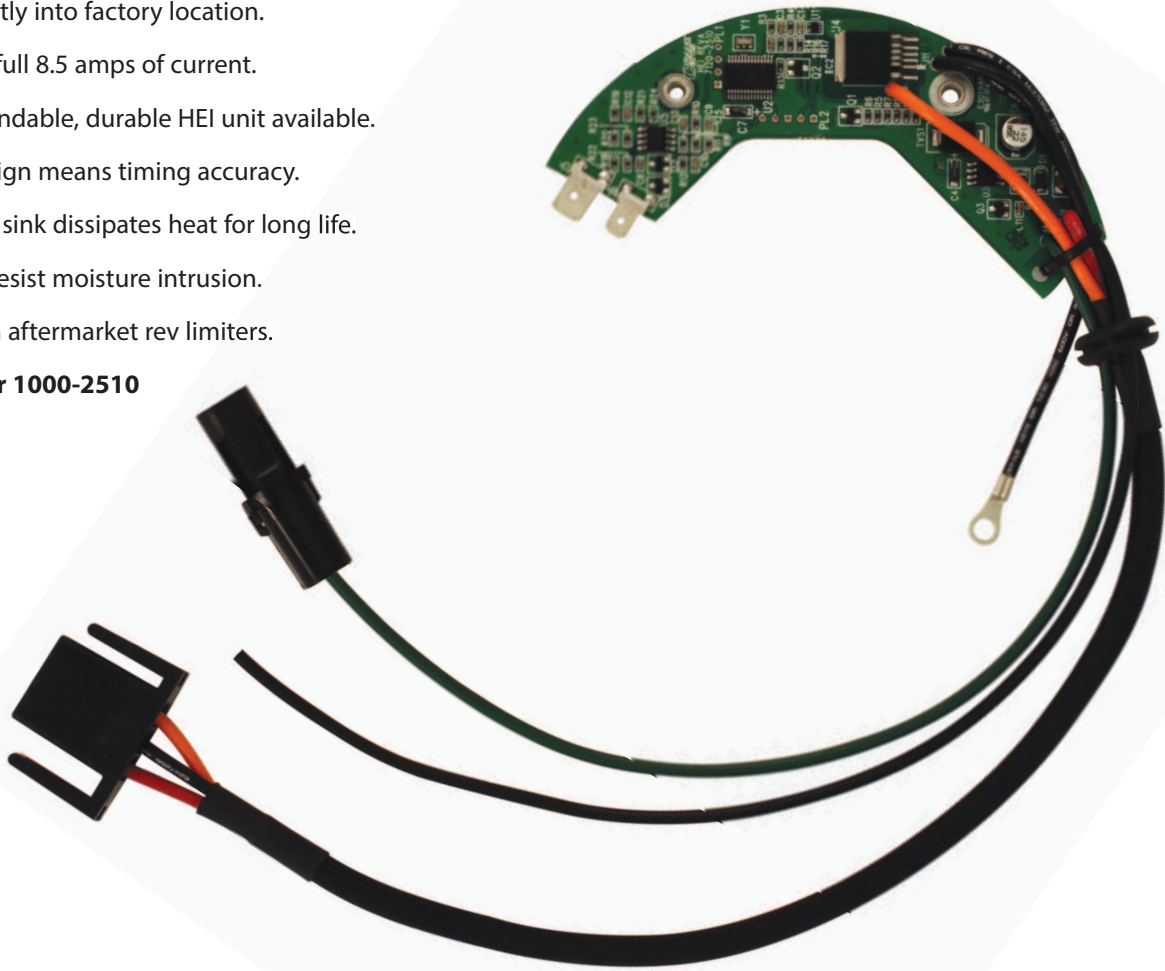
|  |           |  |
|--|-----------|--|
| <i>HI-6RC Ignition Kit For Chevy SB/BB .....</i> 6000-6700C    |           |  |
| HI-6RC Digital CD Ignition with Adj. Rev Limiter, Start Retard | 6000-6700 |  |
| Race Billet Optical Trigger Distributor                        | 1000-1511 |  |
| PS92N E-Core Coil  | 730-0192  |  |
| FireWire® Universal Plug Wire Kit                              | 255-0082  |  |
| <i>HI-6RC Ignition Kit For Ford 289/302 .....</i> 6000-6700SBF |           |  |
| HI-6RC Digital CD Ignition with Adj. Rev Limiter, Start Retard | 6000-6700 |  |
| Race Billet Optical Trigger Distributor                        | 1000-1611 |  |
| PS92N E-Core Coil  | 730-0192  |  |
| FireWire® Universal Plug Wire Kit                              | 255-0083  |  |
| <i>HI-6RC Ignition Kit For Ford 351W .....</i> 6000-6700FW     |           |  |
| HI-6RC Digital CD Ignition with Adj. Rev Limiter, Start Retard | 6000-6700 |  |
| Race Billet Optical Trigger Distributor                        | 1000-1613 |  |
| PS92N E-Core Coil  | 730-0192  |  |
| FireWire® Universal Plug Wire Kit                              | 255-0083  |  |
| <i>HI-6RN Ignition Kit For Chevy SB/BB.....</i> 6000-6750C     |           |  |
| HI-6RN Digital CD Ignition with Adj. Rev Limiter               | 6000-6750 |  |
| Race Billet Optical Trigger Distributor                        | 1000-1511 |  |
| PS92N E-Core Coil  | 730-0192  |  |
| FireWire® Universal Plug Wire Kit                              | 255-0082  |  |
| <i>HI-6RN Ignition Kit For Ford 289/302.....</i> 6000-6750SBF  |           |  |
| HI-6RN Digital CD Ignition with Adj. Rev Limiter               | 6000-6750 |  |
| Race Billet Optical Trigger Distributor                        | 1000-1611 |  |
| PS92N E-Core Coil  | 730-0192  |  |
| FireWire® Universal Plug Wire Kit                              | 255-0083  |  |
| <i>HI-6RN Ignition Kit For Ford 351W .....</i> 6000-6750FW     |           |  |
| HI-6RN Digital CD Ignition with Adj. Rev Limiter               | 6000-6750 |  |
| Race Billet Optical Trigger Distributor                        | 1000-1613 |  |
| PS92N E-Core Coil  | 730-0192  |  |
| FireWire® Universal Plug Wire Kit                              | 255-0083  |  |

# Ignition

## HEI Digital Ignition

- Plugs directly into factory location.
- Outputs a full 8.5 amps of current.
- Most dependable, durable HEI unit available.
- Digital design means timing accuracy.
- Large heat sink dissipates heat for long life.
- Sealed to resist moisture intrusion.
- Works with aftermarket rev limiters.

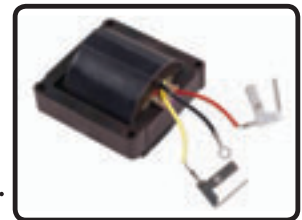
**Part Number 1000-2510**



IGNITION

### Recommended Coils

| Description                          | Part No. |
|--------------------------------------|----------|
| A. PS 91 E-Core Red/White            | 730-0191 |
| B. PS 91 E-Core Red/Yellow           | 730-0291 |
| C. GM HEI Coil in Cap Conversion Kit | 730-0590 |



## Timing Retard Control

- Retard control for performance, race, street, RV and towing applications.
- Driver adjustable under dash mount.
- LED light on module comes on whenever retard is commanded.
- Driver adjustable based on engine knock/load for towing or track conditions.
- Nitrous, turbo and supercharged on-demand retard hook up compatible.
- Boost proportional retard when used with optional boost (MAP) sensor to control amount of retard per PSI of boost pressure.
- Zero to 20 degree adjustable.
- 50 States Legal



### Applications

| Description   | Part No.         |
|---|------------------|
| <b>TRC-2 Timing Retard Control</b><br>The TRC-2 accessory adds zero to 20 degree timing retard to HI-6, HI-6R, HI-6DSR. Three retard modes: continuous, demand, and boost proportional. Sealed unit, suitable for underdash mounting. Not intended for under hood mounting.<br><b>CARB E.O. D-225-57</b>  | <b>6000-6425</b> |
| <b>TRC-1 Timing Retard Control for Ford and Honda applications</b><br>TRC-1 for use with 1983 and later Ford vehicles with TFI-IV ignition systems and 1990 and later Honda 4 cylinder engines, non OBD II. Comes with an installation kit that includes 6 feet of nylon vacuum tubing and adapters for optional MAP sensor.<br><b>CARB E.O. D-225-53</b> | <b>9000-0100</b> |
| <b>MAP Sensor - 2 Bar</b><br>MAP (Manifold Absolute Pressure) sensor. Used as boost sensor for boost proportional retard with TRC-1 and TRC-2.  | <b>9000-0110</b> |

### Specifications

|                             |   |
|-----------------------------|---|
| <b>Operating voltage</b>    | 6 to 18 volts, reverse polarity protected, negative ground only                         |
| <b>Retard range</b>         | 0 to 20 degrees.  |
| <b>Boost pressure range</b> | 0 to 15 psi (with optional MAP sensor)  |
| <b>Boost retard range</b>   | 0 to 4 degrees per psi (with optional MAP sensor, Part No. 9000-0110)                   |
| <b>Dimensions</b>           | 3"L x 2"W x 1-1/2"H, 3/8 lbs.<br><br>Under dash mounting in passenger compartment only. |

## Hall Effect Crank Trigger Sensor

- Absolute stable timing.
- Allows static timing of engine, no timing light required.
- LED light for ease of static timing built right in.
- Compatible with most performance ignitions.
- 3/4-16 UNF threads fit most brackets.
- Accuracy to within  $\pm 0.1$  of a degree.

**Part Number 1000-2100**



# Points Conversion Kits

## Optical Trigger Conversion

- Easy to install in less than 1 hour!
- Converts points-type distributor to precision optically triggered system!
- No maintenance!
- Drives HI-6, HI-6S and most aftermarket ignitions with points/module input.
- Stable timing with precise settings!
- Eliminates spark scatter for greater energy
- No more tune-ups due to worn points!
- Installation kit is required; not included.
- Now you can use a high output CD ignition on your older points-type vehicle!



### Applications

| Description  | Part No. |
|--|----------|
| Optical Trigger Conversion Unit<br>(Installation Kit Required) | 715-0020 |

### Specifications

|                   |   |
|-------------------|---|
| Operating voltage | 6 to 18 volts, reverse polarity protected, negative ground only. Not compatible with 6 volt electrical systems.         |
| Trigger output    | Points/module type (12 volt square wave). Triggers spark on rising edge. 1/4 amp maximum load. Short circuit protected. |

**NOTE: Output cannot directly drive any coil or Part No. 6000-8910 tach adapter.**

## Optical Trigger - Installation Kits

| Description   | Part No. |
|---|----------|
| Includes shutters and brackets for installation of optical trigger on domestic 4, 6 and 8 cylinder and VW/Bosch "009" breaker point distributor applications.   | 700-2226 |
| Includes shutters and brackets for installation of optical trigger on most import 4, 6 and 8 cylinder breaker point applications. Also used as universal installation kit for many other breaker point applications.  | 700-2231 |
| Includes shutters and brackets for installation of optical trigger on 1974-83 imports with 4 and 6 cylinder engines equipped with certain Bosch, Hitachi, or Nippondenso OE Electronic Ignition Modules. For applications where the OE module has failed and must be eliminated.  | 700-2292 |
| Includes shutters and brackets for installation of optical trigger on 1979-83 British imports with 4, 6, and 8 cylinder engines equipped with Lucas OPUS distributors. For applications where the OPUS module has failed and must be eliminated. <b>Note that the HI-6S is not compatible with 12 cylinder engines.</b> | 700-2300 |
| Includes shutters and brackets for installation of optical trigger on Mallory YL Dual Point and Unilite 8 cylinder distributor applications.  | 700-2309 |



## XR-i Points To Electronic Ignition

- Easy 2 wire hook-up.
- Improved fuel mileage.
- Faster, more reliable engine starts.
- Industry's 1st with rev limiter.
- Adjustable rev limiter from 4000-8000 RPM.
- Fully digital and maintenance free.
- Timing picked up from distributor cam lobe.
- Pinpoint accurate ignition timing.
- Complete under cap – restoration perfect.
- Never replace or adjust points again!
- Fully sealed from moisture and dirt.
- High temperature protection — won't leave you stranded!
- **CARB E.O. D-225-67 50 state legal.**

### Applications

| Description                     | Part No. |
|---------------------------------|----------|
| <b>XR-i Only</b>                |          |
| 1959-74 Ford V-8                | 750-1700 |
| 1957-74 Chevy V-8               | 750-1710 |
| 1957-74 (most) Pontiac V-8      | 750-1720 |
| 1967-Up Oldsmobile V-8          | 750-1720 |
| <b>XR-i &amp; PS20 Coil Kit</b> |          |
| 1959-74 Ford V-8                | 750-1705 |
| 1957-74 Chevy V-8               | 750-1715 |
| 1957-74 (most) Pontiac V-8      | 750-1725 |
| 1967-Up Oldsmobile V-8          | 750-1725 |

### Recommended Coils

| Description                     | Part No. |
|---------------------------------|----------|
| A. PS20, Black, Canister Style  | 730-0020 |
| B. PS40, Chrome, Canister Style | 730-0040 |



### Specifications

|                        |  |
|------------------------|--|
| Operating voltage      | 6-18 v. reverse polarity protection, negative ground     |
| Current draw           | 3 amps max @ 5,500 RPM                                   |
| RPM operating range    | 8,000 RPM  |
| RPM limiter range      | 4,000 to 8,000 RPM                                       |
| Primary voltage output | 400 volts (inductive discharge)                          |
| Primary energy output  | 45 millijoules with PS20 coil and 1.65L ballast resistor |
| Peak spark gap current | 50 milliamps with PS20 coil and 1.65L ballast resistor   |
| Spark duration         | 2100 microseconds @ 2,000 RPM                            |



# Points Conversion Ignition

## XR700 Points-To-Electronic Ignition

- Converts points type distributors to electronic ignition!
- Increased timing accuracy.
- Replaces many Bosch, Lucas, Hitachi and ND units.
- Status LED light for easy diagnostics.
- Fully potted for protection from dirt, moisture and vibration.
- Optical trigger for precise ignition timing!
- More powerful signal than points type
- Most reliable of its type
- 6th generation of reliability
- Short circuit proof
- Positive ground compatible
- 50 State Legal

### Applications

| Description  | Part No.        |
|--|-----------------|
| <b>XR700 System</b>  |                 |
| For Domestic 4, 6 and 8 Cylinder and VW/Bosch "009" Distributor Applications. 12 Volt Negative or Positive Ground. For 1975 and earlier vehicles. <b>CARB E.O. D-47-2</b>  | <b>700-0226</b> |
| For Import and Universal 4, 6 and 8 Cylinder Applications. 12 Volt Negative or Positive Ground. For 1975 and earlier vehicles. <b>CARB E.O. D-47-2</b>   | <b>700-0231</b> |
| For 1974-83 Imports with 4 and 6 cylinder engines equipped with Bosch, Hitachi, or Nippondenso OE Electronic Ignition Modules. For applications where the OE module has failed and must be eliminated. See applications chart for details. <b>CARB E.O. D-47-3.</b>  | <b>700-0292</b> |
| For 1979-83 British imports with 4, 6 and 8 cylinder engines equipped with Lucas OPUS distributors. For applications where the OPUS module has failed and must be eliminated. OPUS system has three wires on OE pickup. If pickup has two wires, you have a conventional magnetic pickup distributor and cannot install an optical trigger. You must use an HI-6R (Pt. No. 6000-6400) connected directly to the magnetic pickup in the Lucas distributor. <b>CARB E.O. D-47-3.</b> | <b>700-0300</b> |
| For Mallory YL Dual Point and Unilite Distributor applications only. For 1975 and earlier vehicles. <b>CARB E.O. D-47-3</b>  | <b>700-0309</b> |

### Recommended Coils

| Description                  | Part No. |
|------------------------------|----------|
| PS20, Black, Canister Style  | 730-0020 |
| PS40, Chrome, Canister Style | 730-0040 |



### Specifications

|                               |  |
|-------------------------------|--|
| <b>Operating voltage</b>      | 6 to 18 volts, reverse polarity protected, negative or positive ground. Not compatible with 6 volt electrical systems as these may drop below 4 volts during cranking. |
| <b>Coil current limit</b>     | 4.5 amps (externally limited by ballast resistor on XR700). Internal short circuit protection limit set at 7 amps.   |
| <b>RPM range</b>              | 6,000 RPM (RPM range higher for 4 and 6 cylinder engines).   |
| <b>Primary voltage output</b> | 400 volts (inductive discharge)  |
| <b>Primary energy output</b>  | 60 millijoules with PS20/40 coil.  |
| <b>Peak spark gap current</b> | 60 milliamps with PS20/40 coil.  |
| <b>Spark duration</b>         | 300 microseconds at 6,000 RPM  |
| <b>Dimensions</b>             | 3-1/2"L x 3"W x 1-1/2"H, 1 lb.   |





## XR700 Replacement Parts

### And Optional Accessories

#### A. XR700 Ignition Module

For 12 Volt Negative or Positive Ground (does not include optical trigger or required installation kit)

**Part No. 700-0001**



A.

#### B. Optical Trigger

For XR700 (requires installation kit sold separately)

**Part No. 700-0020**



B.

#### C. XR700 Ignition Module and Optical Trigger

For 12 Volt Negative or Positive Ground (requires installation kit sold separately)

**Part No. 700-0021**



C.

#### D. Installation Kits

**Part No. 700-2226**

Includes shutters and brackets for installation of optical trigger on domestic 4, 6 and 8 cylinder and VW/Bosch "009" breaker point distributor applications.

**Part No. 700-2231**

Includes shutters and brackets for installation of optical trigger on most import 4, 6 and 8 cylinder breaker point applications. Also used as universal installation kit for many other breaker point applications.

**Part No. 700-2292**

Includes shutters and brackets for installation of optical trigger on 1974-83 imports with 4 and 6 cylinder engines equipped with certain Bosch, Hitachi, or Nippondenso OE Electronic Ignition Modules. For applications where the OE module has failed and must be eliminated.

**Part No. 700-2300**

Includes shutters and brackets for installation of optical trigger on 1979-83 British imports with 4, 6 and 8 cylinder engines equipped with Lucas OPUS distributors. For applications where the OPUS module has failed and must be eliminated. Note that the HI-6S is not compatible with 12 cylinder engines.

**Part No. 700-2309**

Includes shutters and brackets for installation of optical trigger on Mallory YL Dual Point and unilite 8 cylinder distributor applications.



D.

## TECH TIPS: BALLAST RESISTANCE

### How can I tell if my vehicle has ballast resistance?

Here's a quick test for ballast resistance. run the engine at fast idle and measure battery voltage using a volt meter. It should be about 14 volts. Then measure the voltage at the COIL+ terminal. If there is a difference of more than 3 volts, a ballast resistor is present.

### When is a ballast resistor required?

A ballast resistor is required only with XR700 systems. Without proper ballast resistance, the XR700 and coil will overheat and fail. All vehicles with original equipment points ignition are factory equipped with ballast resistance. This can be in the form of a ceramic ballast resistor or a resistance wire between the ignition key and COIL- terminal. It can also be in the form of internal resistance within the coil, such as Bosch® blue coils (typical on VW) and Lucas® coils found on older British vehicles.

### What do I need to do about ballast resistance when installing an XR700?

If the vehicle had points and you are keeping the original coil, you do not need to do anything else. If you are changing coils and your vehicle has a ceramic ballast resistor or resistance wire, everything should still be OK. follow the coil installation instructions.

If you are changing coils and your original coil had internal ballast resistance, you must add a ballast resistor (usually supplied with the coil). Use a volt-ohmmeter to check the original coil. Coils with internal ballast resistance will read at 3 ohms or more.

# Points Conversion Ignition

## XR3000 Points-To-Electronic Ignition

- All new status LED light for easy diagnostics.
- 150% greater spark gap energy over stock points ignition.
- Uses high output coil without ballast resistor.
- Optical trigger for precise ignition timing accuracy.
- Converts points type distributor to electronic ignition.
- Fully sealed for protection from dirt, moisture and vibration.
- SMT = "Surface Mount Technology" for reduced size and greater reliability.
- Short circuit protection.
- XR3000 is the high performance version of the XR700.
- 50 States Legal

### Applications

| Description  | Part No.         |
|--|------------------|
| <b>XR3000 System</b>   |                  |
| For Domestic 4, 6 and 8 Cylinder and VW/Bosch "009" Distributor Applications. 12 Volt Negative Ground Only. 1991 and earlier non-computer controlled vehicles. <b>CARB E.O. D-225-52</b> | <b>3000-0226</b> |
| For Import and Universal 4, 6 and 8 Cylinder Applications. 12 Volt Negative Ground Only. <b>CARB E.O. D-225-5</b>  | <b>3000-0231</b> |
| For Replacement of Bosch, Hitachi, and Nippondenso 4 and 6 Cylinder OE Electronic Ignition Modules. 1974-83 vehicles. <b>CARB E.O. D-225-5</b>   | <b>3000-0292</b> |

### Recommended Coils

| Description                                 | Part No. |
|---|----------|
| PS50, Black, Canister Style                 | 730-0050 |
| PS60, Chrome, Canister Style                | 730-0060 |
| PS91, E-Core Coil with Plated-Steel Bracket | 730-0091 |
| LX91 E-Core Coil with Aluminum Bracket      | 730-0891 |



### Specifications

|                               |  |
|-------------------------------|--|
| <b>Operating voltage</b>      | 6 to 18 volts, reverse polarity protected, negative ground. Not compatible with 6 volt electrical systems as these may drop below 4 volts during cranking. |
| <b>Coil current limit</b>     | 4.5 amps internal short circuit protection limit set at 7 amps.  |
| <b>RPM range</b>              | 6,500 RPM  |
| <b>Primary voltage output</b> | 400 volts (inductive discharge)  |
| <b>Primary energy output</b>  | 90 millijoules with PS91 coil.   |
| <b>Peak spark gap current</b> | 100 milliamps with PS91 coil.  |
| <b>Spark duration</b>         | 2800 microseconds at 2,000 RPM   |
| <b>Dimensions</b>             | 5"L x 3"W x 1-1/2"H, 1-1/2 lbs.  |



## XR3000 Replacement Parts

### And Optional Accessories

- A. XR3000 Ignition Module**  
For 12 Volt Negative Ground Only (does not include optical trigger or required installation kit)  
**Part No. 3000-0001**
- B. Optical Trigger**  
For XR3000 (requires installation kit sold separately)  
**Part No. 700-0020**
- C. XR3000 Ignition Module and Optical Trigger**  
For 12 Volt Negative Ground Only (requires installation kit sold separately)  
**Part No. 3000-0021**
- D. Installation Kits**  
**Part No. 700-2226**  
Includes shutters and brackets for installation of optical trigger on domestic 4, 6 and 8 cylinder and VW/Bosch "009" breaker point distributor applications.  
  
**Part No. 700-2231**  
Includes shutters and brackets for installation of optical trigger on most import 4, 6 and 8 cylinder breaker point applications. Also used as universal installation kit for many other breaker point applications.  
  
**Part No. 700-2292**  
Includes shutters and brackets for installation of optical trigger on 1974-83 imports with 4 and 6 cylinder engines equipped with certain Bosch, Hitachi, or Nippondenso OE Electronic Ignition Modules. For applications where the OE module has failed and must be eliminated.



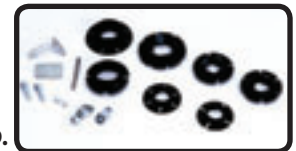
A.



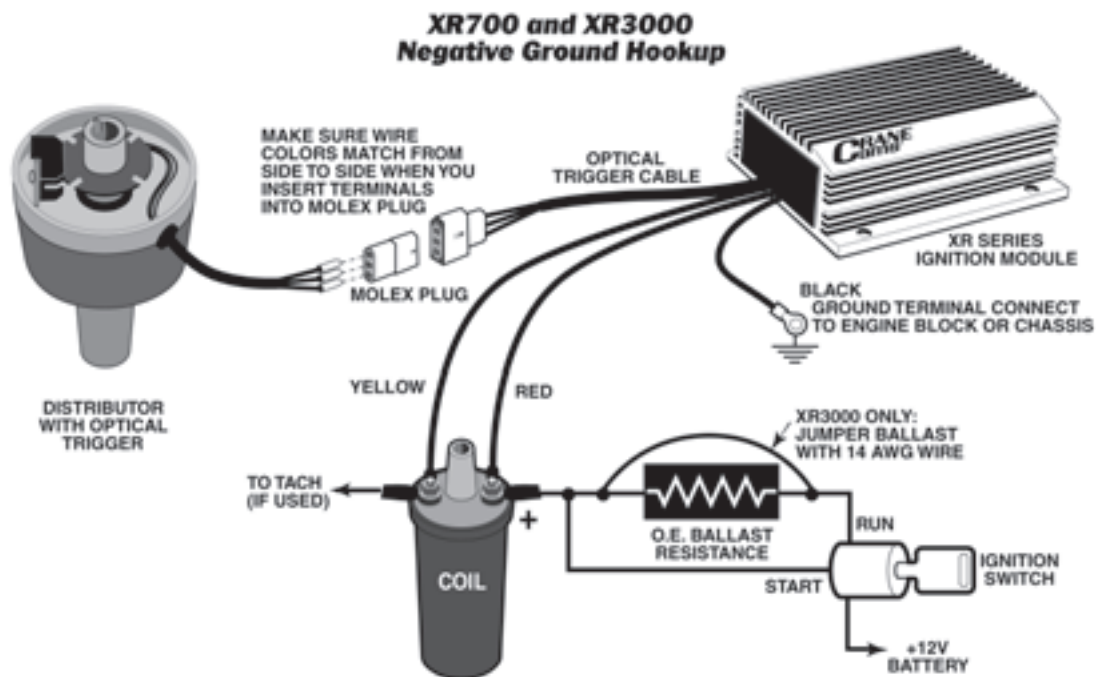
B.



C.



D.



# Distributors

## Race Billet Distributor

- Analog design
- Locked out timing
- Stainless steel shaft
- Billet lower housing
- Large or small cap design
- Bearing on top and bottom
- Includes gear!
- Magnetic trigger
- Highly accurate
- No maintenance!
- Drag Race and Circle Track



### Applications

| Description                 | Part No.  |
|-----------------------------|-----------|
| <b>Large Cap</b>            |           |
| Chevy V8 SB & BB 55-96      | 1000-1510 |
| Chrysler LA 273-318-340-360 | 1000-1810 |
| Ford 289/302                | 1000-1610 |
| Ford 351W                   | 1000-1612 |
| Ford 351C/429/460           | 1000-1614 |
| Ford FE 352-428             | 1000-1616 |

| Description                 | Part No.  |
|-----------------------------|-----------|
| <b>Small Cap</b>            |           |
| Chevy V8 SB & BB 55-96      | 1000-1511 |
| Chrysler LA 273-318-340-360 | 1000-1811 |
| Chrysler B 383-400          | 1000-1812 |
| Chrysler RB 426-440         | 1000-1813 |
| Ford 289/302                | 1000-1611 |
| Ford 351W                   | 1000-1613 |
| Ford 351C/429/460           | 1000-1615 |
| Ford FE 352-428             | 1000-1617 |

### Replacement Parts

| Description                | Part No.  |
|----------------------------|-----------|
| A. Distributor Cap - Large | 1000-1550 |
| B. Cap Adapter             | 1000-1551 |
| C. Distributor Cap - Small | 1000-1552 |
| D. Rotor - Small           | 1000-1556 |
| E. Rotor - Large           | 1000-1557 |



A.



B.



C.



D.



E.

## Oval Track Pro Race Distributors



- Machined, billet housing.
- Approved for use in NASCAR® competition.
- Dual Optical Triggers synchronized at the factory to within  $\pm 0.2$  degrees (crankshaft).
- Precision, stainless steel, photochemically etched trigger disc.
- Electronically synthesized magnetic trigger output.
- Ground and polished steel shaft.
- Wire retainer cap for secure fit.
- Individual cylinder timing capability.
- Double lip seal on shaft for oil and vacuum control.
- Most accurate “out of the box” distributor available.
- Status LED light for quick diagnostic check on optical triggers.
- Adjustable slip collar on GM model.

- Timing light tuning to within  $\pm .5$  degree of optimum timing point.
- Distributor equipped with two optical triggers for redundancy.
- Weatherpak® or Deutsch® style plugs.

### Applications

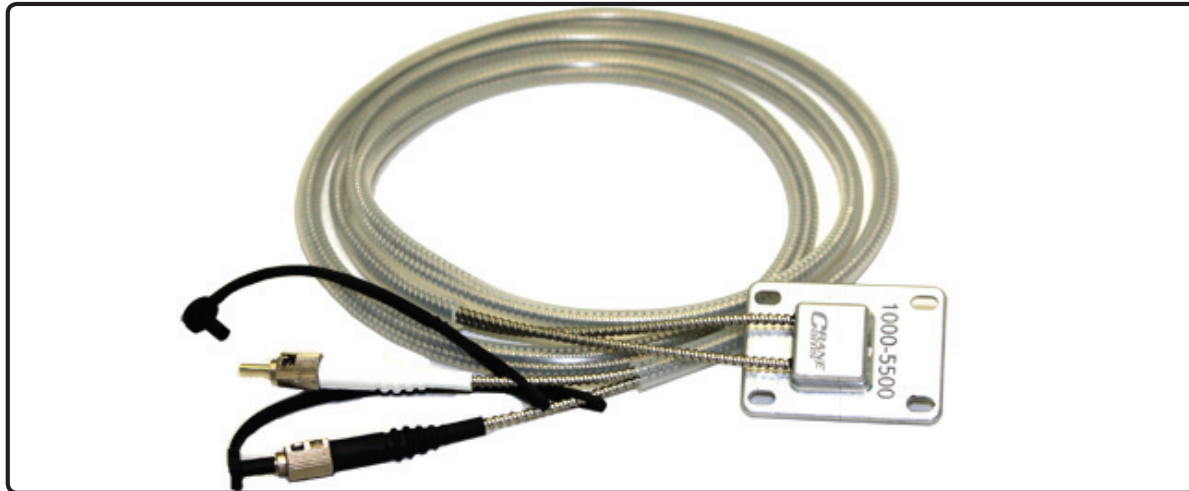
| Description                | Part No.   |
|----------------------------|------------|
| Dodge R5                   | 1000-1409* |
| Dodge R6                   | 1000-1419* |
| Ford S/B                   | 1000-1441  |
| Ford 351W                  | 1000-1401* |
| Ford 351W 90° Trigger      | 1000-1421  |
| Ford FR9                   | 1000-1451* |
| GM S/B, B/B                | 1000-1400* |
| GM S/B, B/B Single Trigger | 1000-1430  |
| GM R07                     | 1000-1440* |
| Toyota (Deutsch®)          | 1000-1412* |

\* Approved for use in NASCAR® competition

# Distributors

## Oval Track Pro Race Distributors

### Optional Accessories and Replacement Parts



A.

**A. Fiber Optics, the absolute most accurate, durable distributor trigger on the market.** High speed, accuracy, repeatability, and strength — all in one and approved for use in NASCAR® competition.  
**Part No. 1000-5500**

**B. Dashboard mount fiber optic trigger interface converter.** High speed laser in a lightweight package approved for use in NASCAR® competition.  
**Part No. 1000-5600**

**C. RH Rotor**  
**Part No. 1000-1404**

**LH Rotor**  
**Part No. 1000-1405**

**D. Distributor Cap**  
**Part No. 1000-1403**

**E. Wire Retainer for Distributor Cap**  
**Part No. 1000-1408**

**F. Optical Trigger Sensor Unit (each) -**  
**Part No. 1000-1424 (Weatherpak)**  
**Part No. 1000-1423 (Deutsch)**

**G. Cap Adapter Kit**  
**Part No. 1000-1411**

**H. Replacement Hardware Kit for Rebuild/Refurbish**  
**Part No. 1000-1406 (not shown)**



B.



C.



D.



E.



F.



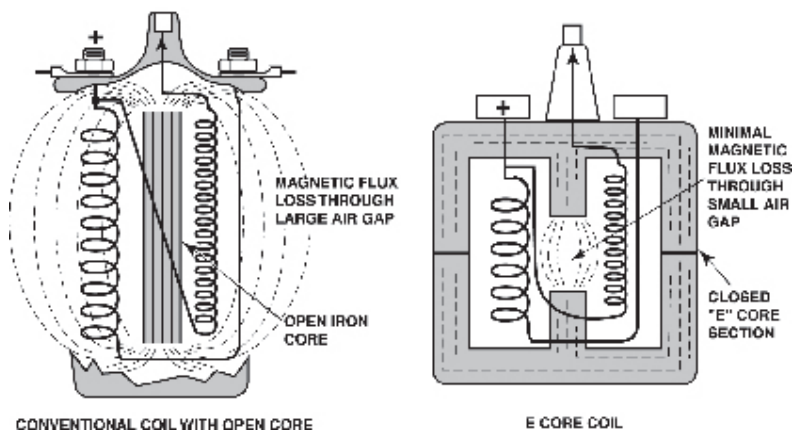
G.

## LX91, LX92 Coils

- **High-output E-core ignition coils.**
- **Up to 70% higher energy at the spark plug than stock** for maximum performance, race or street.
- **E-core design with closed magnetic path.** Reduced leakage inductance cuts losses and improves energy transfer to the spark plug.
- **Solid epoxy encapsulated.** Resists severe shock and harsh vibration.
- **Insulated primary connector for safety.** No exposed high voltage on primary terminals for enhanced safety. An important consideration when used with high output CD systems.
- **SAE-spec high voltage tower protects against arcing.** Improved coil wire retention and longer creep path to protect against high voltage arcing.
- **Heavy gauge wire used for all windings.** Results in much lower resistance and better heat dissipation for greater high RPM endurance.
- **Windings optimized with computer aided design.** Our exclusive CAD (Computer-Aided-Design) windings produce maximum spark gap current and highest available voltage.
- **Crane LX91 and LX92 E-core coils** are 50 states street legal for recommended applications.
- **Lightweight,** low profile black anodized housing.



E-CORE VERSUS CONVENTIONAL COIL



# Performance Ignition Coils

## LX91, LX92 Coils

### A. LX91 High Output Universal E-Core Ignition Coil

Highest possible spark energy and spark gap current – up to 100% greater than comparable OE coils. Recommended coil for street use with Crane HI-6, Mallory® Hyfire®, MSD 6° CD systems. Also works great with Crane HI-6S and XR3000 inductive discharge ignitions. Not for use in race or extended high RPM use with high output ignition. Not for use with points. For 1995 and earlier non-OBD II applications. **CARB E.O. D-225-60**  
**Part No. 730-0891**



A.

### B. LX92 Professional Race Coil for use with CD Racing Ignitions

Professional race coil for use with CD systems only. Highly recommended for maximum performance with Crane HI-6 systems. Gives up to 12 times greater output than OE. Can also be used with Mallory® Hyfire®, MSD 7° and MSD 8° systems. **Caution: MSD 6° systems are not capable of driving the high current demanded by the LX92.** Not compatible with Crane HI-6S, XR-i, XR700, or XR3000 systems. For non-OBD II vehicles with distributor-type CD ignition system.  
**CARB E.O. D-225-60**  
**Part No. 730-0892**



B.

### C. GM HEI Coil in Cap Conversion Kit

Replace your in-cap type coil with a performance externally mounted type.  
**Part No. 730-0590**



C.

### D. LX Series Locking Coil Wire Kit

Coil wire kit with a special locking clip that provides positive retention for demanding race applications. Fits all LX series coils. Includes 40" length of 8.5mm spiral core FireWire and an assortment of boots and terminals to fit both SAE tower style and conventional distributor terminals.  
**Part No. 235-0001**



D.

## Coil Specifications

|                      | LX91                                | LX92      |
|----------------------|-------------------------------------|-----------|
| Primary resistance   | .40 ohms                            | .23 ohms  |
| Secondary resistance | 4.6 kohms                           | 920 ohms  |
| Primary inductance   | 4.7 mH                              | 1.7 mH    |
| Secondary inductance | 14.4 H                              | 4.5-6.5 H |
| Leakage inductance   | .23 mH                              | .14 mH    |
| Turns ratio          | 57:1                                | 60:1      |
| Typical dimensions:  | 3-3/4"L x 2-1/2"W x 3"H, 1-1/4 lbs. |           |



## PS91, PS92, PS92N E-Core Coils

- **High-output E-core coils for race and street.**
- **Up to 70% higher energy at the spark plug than stock** for maximum performance, race or street.
- **E-core design with closed magnetic path.** Reduced leakage inductance cuts losses and improves energy transfer to the spark plug, for maximum ignition performance.
- **Plastic overmolded core with urethane encapsulation.** Improved urethane encapsulation material provides improved protection against severe shock, harsh vibration, and high voltage breakdown. Eliminates the exposed E-core.
- **Insulated primary connector for safety.** No exposed high voltage on primary terminals for enhanced safety. An important consideration when used with high output CD systems. Mating connector included.
- **SAE-spec high voltage tower.** Improved coil wire retention and longer creep path to protect against high voltage arcing.
- **Crane PS91 and PS92 E-core coils** are 50 states street legal for recommended applications.
- **Custom fit coils** are available for most Ford and GM original equipment (OE) replacement purposes.



### Coil Specifications

|                      | PS91                                    | PS92      | PS92N                                   |
|----------------------|---|-----------|---|
| Primary resistance   | .43 ohms                                | .20 ohms  | .20 ohms                                |
| Secondary resistance | 3.0 kohms                               | .82 kohms | .82 kohms                               |
| Primary inductance   | 5.5 mH                                  | 1.9 mH    | 1.9 mH                                  |
| Secondary inductance | 16 H                                    | 6.8 H     | 6.8 H                                   |
| Leakage inductance   | .32 mH                                  | .14 mH    | .14 mH                                  |
| Turns ratio          | 54:1                                    | 60:1      | 60:1                                    |
| Typical dimensions:  | 4-1/2"L x 3-1/2"W x 3-1/2"H, 2-3/4 lbs. |           | 4-1/2"L x 3-1/2"W x 3-1/4"H, 2-1/8 lbs. |

# Performance Ignition Coils

## PS91, PS92, PS92N E-Core Coils

### A. PS91 High Output E-Core Ignition Coil

Up to 100% greater than stock coils and 70% greater than competitors coils! (SAE J973a tests) For street use with Crane XR3000 and HI-6S, Mallory® Hyfire® and MSD-6® CD systems. **Not for use with points.** For 1995 and earlier non-OBD II with distributor ignition. **CARB E.O. D-225-60**

**Part No. 730-0091**

A.



### B. PS92 Performance Coil for Use with CD Ignition Systems

Street performance coil for use with CD systems only. Recommended for maximum performance with Crane HI-6 systems. Produces up to 12 times greater output than OE. Can also be used with Mallory® Hyfire®, MSD7® and MSD8® systems. Not compatible with Crane HI-6S, XR700, or XR3000 systems. Includes nickel plated bracket. For 1995 and older non-OBD II vehicles with distributor type, CD ignition system. **CARB E.O. D-225-60**

**Part No. 730-0092**

B.



### C. PS92N Race Coil for Use with CD Ignition Systems

Coil for use with CD systems only. Recommended for race applications and extended high RPM use. Includes lightweight black anodized aluminum bracket. **CARB E.O. D-225-60.**

**Part No. 730-0192**

C.



### D. PS 91 E-Core Red/Yellow

**Part No. 730-0291**

D.



### E. PS91 Coil for GM Coil-In-Cap HEI with Red/White Wires

Same characteristics as standard PS91. Drop in upgrade for 1974-up GM internal coil-in-cap HEI systems. Includes special low resistance carbon button.

**CARB E.O. D-225-60.**

**Part No. 730-0191**

E.



### F. PS91 Coil for Ford TFI-IV Applications

Same characteristics as standard PS91. Direct plug-in upgrade for Ford E-core coil used in 1983 and later TFI-IV systems. Fits OE bracket and connector.

**CARB E.O. D-225-60.**

**Part No. 730-0391**

F.



### G. PS91 Coil for GM External HEI Applications

Same electrical characteristics as standard PS91. Direct plug-in upgrade for late model GM external HEI coil with dual plugs used on many 1985 and later GM vehicles. Fits OE bracket and connectors. **CARB E.O. D-225-60.**

**Part No. 730-0491**

G.



### H. Replacement Low Resistance Carbon Button for GM Coil-In-Cap HEI

Replacement part for low-resistance carbon button supplied with **730-0191** and **730-0291** coil.

**Part No. 730-8412**

H.



### I. PS91 Coil To GM External HEI Adapter

Allows installation of Crane FireBall PS91 ignition coil **730-0091** in late model GM vehicles, 1985-95. Not required with **730-0491** coil.

**Part No. 6000-8878**

I.



### J. GM HEI Coil-In-Cap Conversion Kit

Replace your in-cap type coil with a performance externally mounted type. Includes length of wire and assorted boots and terminals.

**Part No. 730-0590**

J.



### K. Coil Harness for PS91/PS92 Coils (Pair)

**Part No. 6000-6465** (not shown)

## PS20, PS40, PS50, PS60 Canister Style Ignition Coils

- **Canister-style, oil-filled performance and replacement coils.** Crane offers a complete line of canister style oil filled coils for both performance and universal replacement applications. For optimum performance on newer vehicles that do not require a canister style coil, use our PS and LX series E-core coils.
- **20-50% higher energy at spark plug than typical stock coils.** Gives improved starting, better throttle response, and more high end power. Tested to conform to SAE J973a test procedure.
- **Oil filled** for maximum cooling of internal windings and high reliability.
- **Windings optimized with computer aided design** for maximum spark gap current and high available voltage.
- **Alkyd coil towers.** Alkyd coil towers eliminate failure from flash over and carbon tracking.
- 50 states street legal.

### Coil Specifications

|                             | PS20                          | PS40         | PS50      | PS60         |
|-----------------------------|-------------------------------|--------------|-----------|--------------|
| <b>Primary resistance</b>   | 1.4 ohms                      | 1.4 ohms     | .40 ohms  | .40 ohms     |
| <b>Secondary resistance</b> | 5.2 kohms                     | 5.2 kohms    | 3.8 kohms | 3.8 kohms    |
| <b>Primary inductance</b>   | 7.5 mH                        | 7.5 mH       | 5.3 mH    | 5.3 mH       |
| <b>Secondary inductance</b> | 26 H                          | 26 H         | 15 H      | 15 H         |
| <b>Leakage inductance</b>   | 1.3 mH                        | 1.3 mH       | .50 mH    | .50 mH       |
| <b>Turns ratio</b>          | 60:1                          | 60:1         | 54:1      | 54:1         |
| <b>Finish</b>               | Black                         | Nickel Plate | Black     | Nickel Plate |
| <b>Typical dimensions:</b>  | 2-1/8"D x 5-3/4"L, 1-3/4 lbs. |              |           |              |

### Applications

| Description  | Part No. |
|--|----------|
| <b>A. PS20 Premium Street Coil</b><br>Great as a high output replacement for OE electronic ignition and points applications on vehicles that require a conventional round coil. Designed for use with Crane XR700 ignitions. For general purpose use in applications when engine RPM does not exceed 6500 RPM. Includes ballast resistor for points applications. Black finish. Fits most OE brackets. <b>CARB E.O. D-225-60</b> | 730-0020 |
| <b>B. PS40 Nickel Plated Premium Street Coil</b><br>Chrome appearance version of PS20. Electrical characteristics and applications same as PS20. <b>CARB E.O. D-225-60</b>   | 730-0040 |
| <b>C. PS50 Performance Coil</b><br>Special low resistance windings. Output characteristics similar to Crane PS91 E-core coil. Designed for extended use such as oval track, road racing, off road, and high RPM street engines. Compatible with all OE electronic ignitions. Recommended for use with Crane XR3000, and HI-65. Not for use with points. Black finish. Fits most OE brackets. <b>CARB E.O. D-225-60</b>           | 730-0050 |
| <b>D. PS60 Performance Coil</b><br>Special low resistance windings. Output characteristics similar to Crane PS91 E-core coil. Designed for extended use such as oval track, road racing, off road, and high RPM street engines. Compatible with all OE electronic ignitions. Recommended for use with Crane XR3000, and HI-65. Not for use with points. Nickel plated finish. Fits most OE brackets. <b>CARB E.O. D-225-60</b>   | 730-0060 |



A.



B.



C.



D.

# Performance Plug Wires

## 8.5mm Fire Wire

### LOW RESISTANCE!

- **Double-silicone reactive core spark plug wire sets.**
- **Up to 50% more spark energy!** FireWire's low per-foot resistance transmits up to 50% more energy to the spark plugs than other "performance" suppression core wires.
- **8.5mm pure silicone double-layer construction!** Our 8.5mm "silicone-on-silicone" design resists high underhood temperatures and insulation breakdown caused by abrasion. Designed for use on tube-steel header equipped racing engines!
- **State-of-the-art "reactive core" filters RFI!** FireWires actually filter out RFI and EMI noise generated by today's high-output ignition systems, protecting on-board computer systems and instruments!
- **High performance 550 degree boots!**
- **Pure Silicone Boots**



## 8.5mm Sleeved FireWire®

- Racing-design, braided, fiberglass sleeving offers an extra barrier layer of protection against abrasion and extreme heat up to 1200° F.
- The ultimate spark plug wire for drag racing, oval track, road racing, marine or serious street performance!
- Exclusive Reactive-Core design actually filters RFI "noise" from the highest-output electronic ignition systems.
- Kevlar® reinforced with braided fiberglass mesh for added strength and protection.
- Pure silicone outer jacket features a double-layer of protection against extreme heat and underhood fluids.
- Available for small-block and big-block, over and under valve covers. Black only. Pre-terminated custom sets for specific engine applications or universal cut-to-fit sets.



## 8.5mm Fire Wire

| Universal Application "Cut to Fit" Sets |                         | 8.5 mm (Black) | 8.5 mm (Sleeved) |
|---|-------------------------|----------------|------------------|
| <b>4 Cylinder</b>                       |                         |                |                  |
| All                                     | Universal Straight Boot | 255-0041       | N/A              |
| <b>6 Cylinder</b>                       |                         |                |                  |
| All                                     | Universal Straight Boot | 255-0061       | N/A              |
| <b>8 Cylinder</b>                       |                         |                |                  |
| All                                     | Universal Straight Boot | 255-0081       | 295-0081         |
| All                                     | Universal 90 Degree     | 255-0082       | 295-0082         |
| All                                     | Universal 45 Degree     | 255-0083       | 295-0083         |

| Numbering Kits                                       | Part Number |
|--|-------------|
| Cylinder Numbering Heat Shrink Kit - 8.5mm Universal | 230-0007    |

| Coil Wire  | Part Number |
|--|-------------|
| 40" Universal Coil Wire for Crane Cams LX Series coils. Clamp is custom fitted to coil boot. | 235-0001    |
| LX Coil Boot & Clip Kit  | 235-0003    |
| Coil wire only - 10.5" long with 90 Degree HEI Boots   | 235-0004    |

| Custom Application           |                   | Spark Plug Boot | Distributor Terminal | 8.5 mm Part No.             |
|------------------------------|-------------------|-----------------|----------------------|-----------------------------|
| <b>Small Block Chevy V-8</b> |                   |                 |                      |                             |
| All                          | Over Valve Covers | 90 Degree       | non-HEI              | 255-2400                    |
| All                          | Over Valve Covers | 90 Degree       | HEI                  | 255-2402                    |
| All                          | Under Headers     | 90 Degree       | non-HEI              | 255-2405                    |
| All                          | Under Headers     | 90 Degree       | HEI                  | 255-2407                    |
| <b>Big Block Chevy V-8</b>   |                   |                 |                      |                             |
| All                          | Under Headers     | 90 Degree       | HEI                  | 255-2416                    |
| All                          | Over Valve Covers | Straight        | non-HEI              | 255-2417                    |
| <b>LS1/LS6</b>               |                   |                 |                      |                             |
| Camaro, Corvette, Firebird   | 2002-up           |                 |                      | 8.0 mm Part No.<br>255-2419 |
| Truck LS1 Vortec             | 2002-up           |                 |                      | 255-2420                    |
| <b>Ford</b>                  |                   |                 |                      |                             |
| All                          | 351W Engines      | 45 Degree       | HEI-style            | 8.5 mm Part No.<br>255-2426 |
| <b>GM Sprint Car</b>         |                   |                 |                      |                             |
| GM Sprint Car Set            |                   |                 |                      | 255-2404                    |

| Custom Fit Hi-Temp Sleeved Sets |                            | Spark Plug Boot | Distributor Terminal | 8.5 mm Part No. |
|---------------------------------|----------------------------|-----------------|----------------------|-----------------|
| <b>Big Block Chevy V-8</b>      |                            |                 |                      |                 |
| All                             | Under Headers              | 90 Degree       | HEI                  | 295-2416        |
| <b>Chrysler/Dodge</b>           |                            |                 |                      |                 |
| 95-2001                         | 2.0L SOHC                  |                 |                      | 255-4100        |
| 2001-up                         | 2.4L DOHC, SRT-4, PT Turbo |                 |                      | 255-4040        |
| <b>Ford</b>                     |                            |                 |                      |                 |
| All                             | 351W Engines               | 45 Degree       | HEI-style            | 295-2426        |
| Ford USAR® Pro Cup Motor        |                            |                 |                      | 295-2428        |
| <b>GM</b>                       |                            |                 |                      |                 |
| GM USAR® Pro Cup Motor          |                            |                 |                      | 295-2401        |

# Performance Plug Wires

## FireWire Spark Plug Wire

### Now Available in Convenient 100' Rolls

- Engine builders, performance retailers and tuner shops will now be able to economically build custom ignition wire sets now that Crane is offering its remarkable FireWire in convenient 100-foot rolls.
- Crane's FireWire has a low resistance which assures that maximum spark energy is delivered to the plugs.
- FireWire features a state-of-the-art reactive core design, which effectively filters out RFI and EMI "noise" created by high-output ignition systems. This protects onboard computer systems, instruments, and preserves audio clarity.
- The wire features 8.5mm pure silicone double-layer construction that is Kevlar weave reinforced for strength.
- FireWire is designed for use with tubular steel headers and extreme heat up to 1200° (F).

Also available from Crane are a variety of boots and terminals in handy 2-packs & 25-packs that will allow the builder to construct ignition wire sets for virtually any 4, 6 or 8-cylinder engine.

### Applications

| Description   | Part No.    |
|---|-------------|
| A. 100' roll of FireWire                            | 255-0001    |
| B. 2-pack of 90° spark plug boots & terminals       | 255-0010-2  |
| B. 25-pack of 90° spark plug boots & terminals      | 255-0010-25 |
| C. 2-pack of straight spark plug boots & terminals  | 255-0011-2  |
| C. 25-pack of straight spark plug boots & terminals | 255-0011-25 |
| D. 2-pack of 45° spark plug boots & terminals       | 255-0013-2  |
| D. 25-pack of 45° spark plug boots & terminals      | 255-0013-25 |
| E. 2-pack of 90° cannister coil boots & terminals   | 255-0025-2  |
| E. 25-pack of 90° cannister coil boots & terminals  | 255-0025-25 |
| F. 2-pack of 90° HEI spark plug boots & terminals   | 255-0032-2  |
| F. 25-pack of 90° HEI spark plug boots & terminals  | 255-0032-25 |



## Digital Rev Limit Tester

- Accurately measures the rev limit of any Crane Cams Digital HI-6 series, MSD® 6 series, or Mallory® CD ignition system to within +/- 5 RPM.
- Tach calibration feature built in to check accuracy of tachometer in car.
- Comes with test plug and FireWire® length to fire the coil.

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# Warranty

## How to Return Product for Warranty

Should you encounter problems with any Crane Cams product, we urge you to **first contact one of our Crane Cams Technical Service Reps** before you return the items for warranty consideration. Many times problems come from the specific application, and its variances, and can be easily solved on the phone.

If you are advised by the Crane representative to return the parts for warranty consideration you will be issued a **Return Goods Authorization (RGA)** number. Please refer to this **RGA number** in all future actions or correspondence about this claim.

**DO NOT RETURN CRANE PRODUCTS TO THE DISTRIBUTOR WHERE THEY WERE ORIGINALLY PURCHASED!**

Instead, write out detailed information regarding your problem (don't forget your **RGA number!**) and **enclose the note along with the parts** you wish to return. Be sure to include **your full name, address, daytime telephone number, engine make, year, cubic inches, modifications to the engine and the Crane Cams person with whom you spoke**. Also, **where the parts were purchased, and when they were bought**. Even though you phoned, you must still include a note along with the parts being returned. Failure to do this can delay your warranty claim.

If the product is a **hydraulic or mechanical lifter cam** being returned, you **must also return all of the lifters used** (if they are Crane) for evaluation. **Crane's warranty is limited to repair or replacement of Crane products only.** Non-Crane parts will be returned

**upon your request only.** Send the note and the parts you wish to return to:

**Crane Cams  
Attn: Warranty Dept.  
1830 Holsonback Drive  
Daytona Beach, FL 32117**

Should you telephone about any warranty claim parts already returned to us, be sure to ask for Customer Service **(866-388-5120)**. We answer phone calls Monday through Friday, 8:00 am to 5:00 pm.

Crane Cams normally handles claims in less than 10 days of receipt of the parts. We will return any repaired or replaced warranty parts prepaid for surface shipping, at our expense. (We reserve the right to select the carrier.)

## Crane Cams Limited Warranty

Crane Cams warrants that all of its products are free from defects in material and workmanship. All Crane Cams performance products are subject to the conditions established in this policy.

Crane Cams warrants that when our products are properly installed in their correct application, they will be free from defect and will function as specified.

Due to the variety of modifications made on performance engines that may affect performance, economy and engine life, Crane Cams' obligation under this warranty is limited to the repair or replacement, only of Crane products, when the consumer returns these Crane Cams products directly to Crane Cams, Warranty Department, 1830 Holsonback Drive, Daytona Beach, FL 32117.

There is absolutely no warranty, implied or otherwise, on Crane Cams parts used in competition (racing) engine applications.

This limited warranty begins on the date of purchase and is good for a period of one year from the

validated date of purchase unless otherwise specified to the original purchaser.

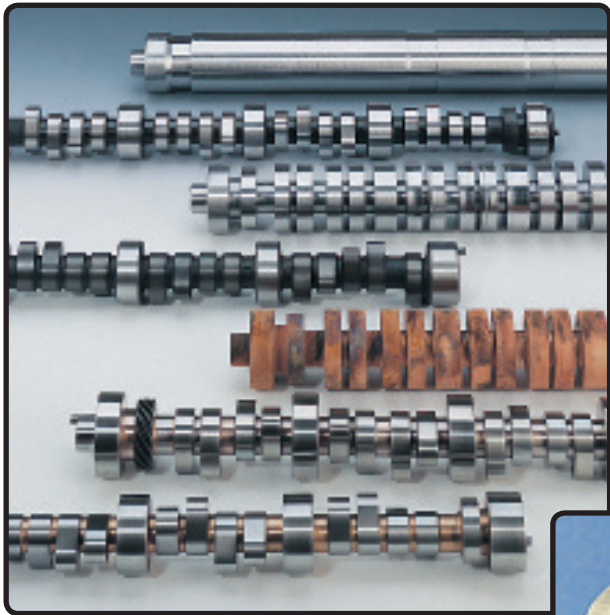
This warranty will be void on all products that show evidence of misapplication, improper installation, abuse, lack of proper maintenance, negligence, racing engine use, or alteration from their original design.

Crane Cams reserves the right to make necessary changes in the products it manufactures and markets at any time to improve product performance. These changes in products will be made without obligation to change or improve products that were previously manufactured.

This warranty limits any implied warranty to one year, and no person, company or organization is authorized to assume for Crane Cams any other liability in connection with the sale of Crane Cams products. Some states do not allow limitations on how long an implied warranty lasts.

This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

# Cams...from Beginning to End!



## **Genuine Crane 8620 and 9310 Steel Billet Cams... The Strongest Available!**

Our famous carburized roller cams begin as 8620 or 9310 alloy steel billet bar stock. Each cam then undergoes numerous precision manufacturing operations required to produce a finished cam. You can identify a genuine Crane cam core by the distinctive copper plating between the lobes! Crane 8620 and 9310 steel billet cam cores are used by prominent racers, engine builders, and manufacturers.

## **Lobe-To-Lobe, Cam-To-Cam Accuracy!**

**Only** Crane Cams delivers that famous Crane **lobe-to-lobe, cam-to-cam accuracy** that engine builders trust! Crane Cams are always **measurably more accurate** because we begin with the industry's most accurate tooling and end with the industry's most accurate manufacturing... **all performed in-house**, by Crane!



## **Roller Cam Power With Hydraulic Cam Convenience!**

The world's finest, strongest, most durable **carburized** and **induction hardened** steel billet cams and the proven power making capabilities of Crane Cams' **hydraulic roller** lobe profiles produce roller cam power with the easy maintenance of a standard hydraulic cam!

## **The World's Most Powerful Cam Profiles For All-Out Racing!**

For more than 55 years Crane Cams have powered **winners** and **broken records!** Crane-pioneered **dual-pattern** cam lobe profiles first appeared in the 1960's, and are today's primary component in shattering drag racing's 330 mph Top Fuel barrier and the Pro/Stock 200 mph barrier! When records fall, Crane Cams make it happen!



# **CRANE Cams<sup>®</sup>**

**Daytona Beach, FL  
Phone 386-310-4875  
Toll Free 866-388-5120  
Fax 386-236-9983  
[www.cranecams.com](http://www.cranecams.com)**

