

Transmission Report

Volume 3, No. 3

October 2012

It's Not All Smoke & Mirrors

New Sonnax Improvements for the 4L60 3-4 Clutch

After 30 years of 3-4 clutch problems, something new has been developed that finally solves underlying faults with the 4L60, 4L60-E, 4L65-E and 4L70-E input housing. Although incremental improvements have been made addressing these problems, they failed to keep pace with steadily increasing power levels of modern performance engines...until now.

The NEW Sonnax SMART-TECH™ input housing kit conquers all the 3-4 clutch issues as no other housing has done before!

How did Sonnax do it? We tackled 3-4 clutch problems by focusing on a single solution to five known weaknesses of the input housing:

- Limited 3-4 clutch capacity
- 3-4 Backing plate flexing and distortion
- Aluminum housing breaks in the shaft/spline area
- Input housing fatigue failure
- 3-4 Retaining ring blow-out at high pressures

Continued on page 2...

SMART-TECH™ Input Housing Kit

A Bolt-On "Anchor Plate"

Zero-flex, bolt-on 3-4 anchor plate replaces OE backing plate to eliminate clutch pack distortion and uneven clamping pressure for longer clutch life.

Fifteen bolts secure plate, eliminating snap-ring and blow-out concerns.

B 3-4 Clutch Apply Plate

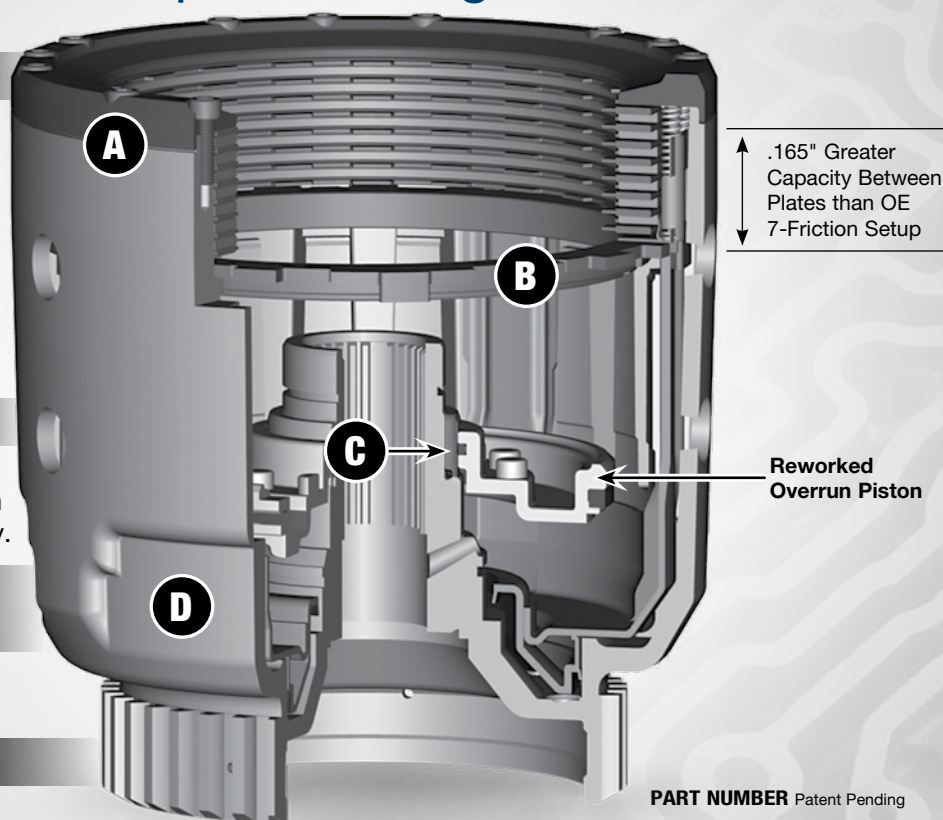
Anchor plate works with redesigned apply plate for more room and clutch options for increased torque capacity.

C Input Drum Reinforcement Sleeve

Steel sleeve prevents breakage in the spline area.

D Modified Input Housing

Treated housing is significantly more resistant to fatigue failure.



PART NUMBER Patent Pending

77733-06K

Smart-Tech™ Input Housing Kit

77733-06K Patent Pending

- 3-4 Clutch Anchor (Backing) Plate
- Modified Input Housing
- Input Drum Reinforcement Sleeve
- PTFE Impregnated Rear Stator Support Bushing
- O-Ring
- Reworked OE Overrun Piston
- Overrun Piston O-Ring
- Overrun Piston Outer Seal
- FWD Piston Outer Seal
- FWD Piston Inner Seal
- 3-4 Clutch Apply Plate
- 3-4 Clutch Return Springs (10)
- Socket Head Cap Screws (15)



How Sonnax Solved the 3-4 Clutch Problem

Bolt-On Anchor Plate Replaces OE Backing Plate & Solves Three Known Housing Weaknesses

The most radical feature of the Smart-Tech input housing is the bolt-on backing plate Sonnax calls the “anchor plate” (patent pending). The anchor plate attaches to the aluminum housing with 15, 180,000 psi high-strength bolts. This single change is the most significant improvement in the 3-4 clutch since the original design was introduced with the 700-R4 in 1982. The bolt-on anchor plate solves three of the known housing weaknesses:

Limited 3-4 Clutch Capacity

3-4 Clutch capacity is improved by increasing the space between apply and backing plates, making room for more clutches and thicker steels than ever before possible. The extra space is created by eliminating the traditional 3-4 retaining ring/backing plate and using a custom, thinner-yet-stiffer apply plate. These changes increase the space between apply and backing plates by .210" in the Smart-Tech housing compared to an OE six-friction setup. Or, compared to an OE 4L65-E/4L70-E seven-friction clutch pack, the increased space allows for an additional eight-friction disc without requiring thinner plates. Alternatively, nine thinner frictions can be used with thinner, early 700-R4 .077" steels (**Figure 1**).

Figure 1

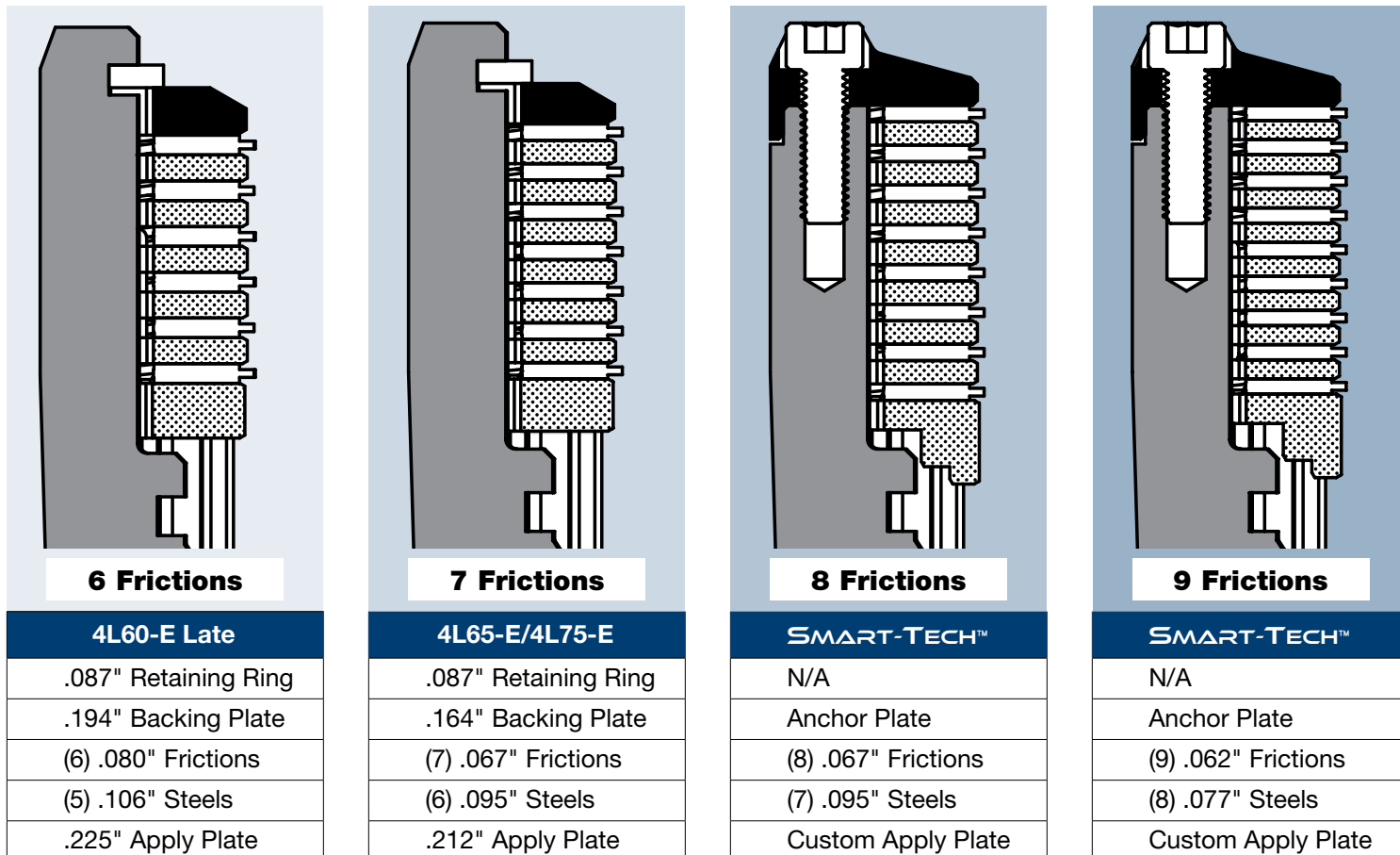
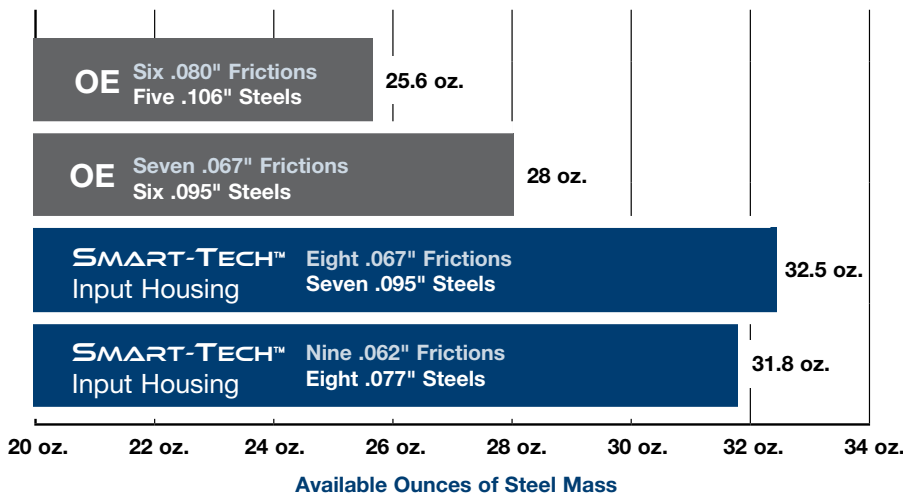


Figure 2

Steel Mass of Different 4L60 3-4 Clutch Options

Shown here are the ounces of steel mass available to dissipate heat during 3-4 shift events. (Does not include apply plate or pressure plate.)



The Smart-Tech housing design results in two significant advantages. With either friction and steel option, the additional clutches provide a significant clutch torque capacity increase over the OE options. Secondly, either option increases the amount of steel mass in the clutch pack for greater heat dissipation when compared not only to OE, but to aftermarket alternatives involving additional – but thinner – steels (Figure 2). Because of user preferences, clutches are not included with the Smart-Tech input housing kit.

3-4 Backing Plate Flexing & Distortion

3-4 Clutch capacity is further improved by eliminating virtually all backing plate flex and distortion with the bolt-on anchor plate. OE backing plates come in seven thicknesses ranging from .144" to .241" thick. The common thickness found in most units is .194". Testing has shown that, at normal apply pressures, a .194" thick backing plate will flex or bow out in a dish shape approximately .015".

Thinner OE or even thinner aftermarket plates are not as stiff and will flex even more dramatically. This is critically important, because when the backing plate flexes and bows, it is no longer flat and parallel with the apply plate, which undermines clutch durability. This uneven apply severely reduces clutch holding (or torque) capacity and reduces clutch life. This flexing becomes even worse in situations where there is elevated line pressure.

The Sonnax Smart-Tech bolt-on anchor plate and thinner-yet-stiffer apply plate ensure – for the first time since the OE design was introduced – that the clutches are applied between two flat and parallel plates as intended!

3-4 Retaining Ring Blow-Out at High Pressures

Though not as common as the capacity issues and flexing, 3-4 retaining ring blow-out is known to occur when line pressures are increased in racing applications. The bolt-on anchor plate eliminates this danger.

Treated Housing Protects Against Breaks Outside the Shaft/Spline Area

After the bolt-on anchor plate, the next most-noticeable difference with the Smart-Tech input housing is the color and surface change. This is from a special treatment process that greatly reduces stress crack formation. In a process similar to shot-peening, the Smart-Tech housings are individually processed to compress the outermost surface so that it can withstand greater loads before cracks begin to form. This significantly improves aluminum housing fatigue failure resistance and housing life.

Input Drum Reinforcement Sleeve Prevents Aluminum Housing Breaks in the Shaft/Spline Area

A popular way to eliminate housing failure in shaft/spline area is Sonnax input drum reinforcement kit 77733-01K, which is included with the Smart-Tech input housing.

3-4 Clutch return springs also are included with the Smart-Tech kit. The extra length of these springs accommodates the increased distance between apply and backing plates. Transmission builders will debate whether these springs are needed in OE applications. They are included in this kit to help keep the apply plate in the released position when the 3-4 clutch is released and minimize residual drag from the increased number of clutches. The total spring force is minimal and does not significantly detract from the overall apply forces.

PTFE-Impregnated Rear Support Bushing Stops Wear

In OE applications this bushing commonly wears, leading to unit failure. With the Smart-Tech input housing, weight is added to the drum by the added clutches and the bolt-on anchor plate. The highly wear-resistant, PTFE impregnated, steel-backed bushing eliminates wear concerns with this bushing, even with the extra weight. ◀

1 94987-05K*

Oversized Lockup Control Valve & Cutback Valve Kit

Helps cure:

- TCC apply/release problems
- Converter codes
- Burnt converters

Note: Requires tool kit F-94987-TL5 & the VB-FIX reaming fixture.



2 94987-01K

Cutback Valve & Sleeve Kit

Helps cure:

- Engine stalls when put in gear
- Low line pressure
- Converter apply complaints



3 94987-17K

Oversized Secondary Regulator Valve Kit

Helps cure:

- Converter & transmission overheating
- Loss of power
- Planetary & bushing failure

Note: Requires tool kit F-94987-TL17 & the VB-FIX reaming fixture.

***NOTE:** 94987-05K can only be used with modulated TCC apply systems.



VB-FIX

Patent No. 7,220,085

What's the VB-FIX?

Get consistent, reliable results & minimize costly reaming errors.

The patented Sonnax VB-FIX™ is a self-aligning fixture that provides an external rigid pilot bore for the reamer and guide pin. This unique design lets the fixture to be used on multiple valve bodies and valve bores.

Special tool kits designed to service a specific bore are used with the VB-FIX. Sonnax part numbers for these kits begin with an "F-" to distinguish them from stand-alone Sonnax tools. Detailed reaming instructions come with every tool kit and part which requires VB-FIX.

Only the patented VB-FIX reamer alignment system can deliver consistent bore-to-valve clearances. The VB-FIX process allows rebuilders to accurately locate the original bore centerline and then securely hold the reamer, ensuring that the reamed bore will remain on that centerline.

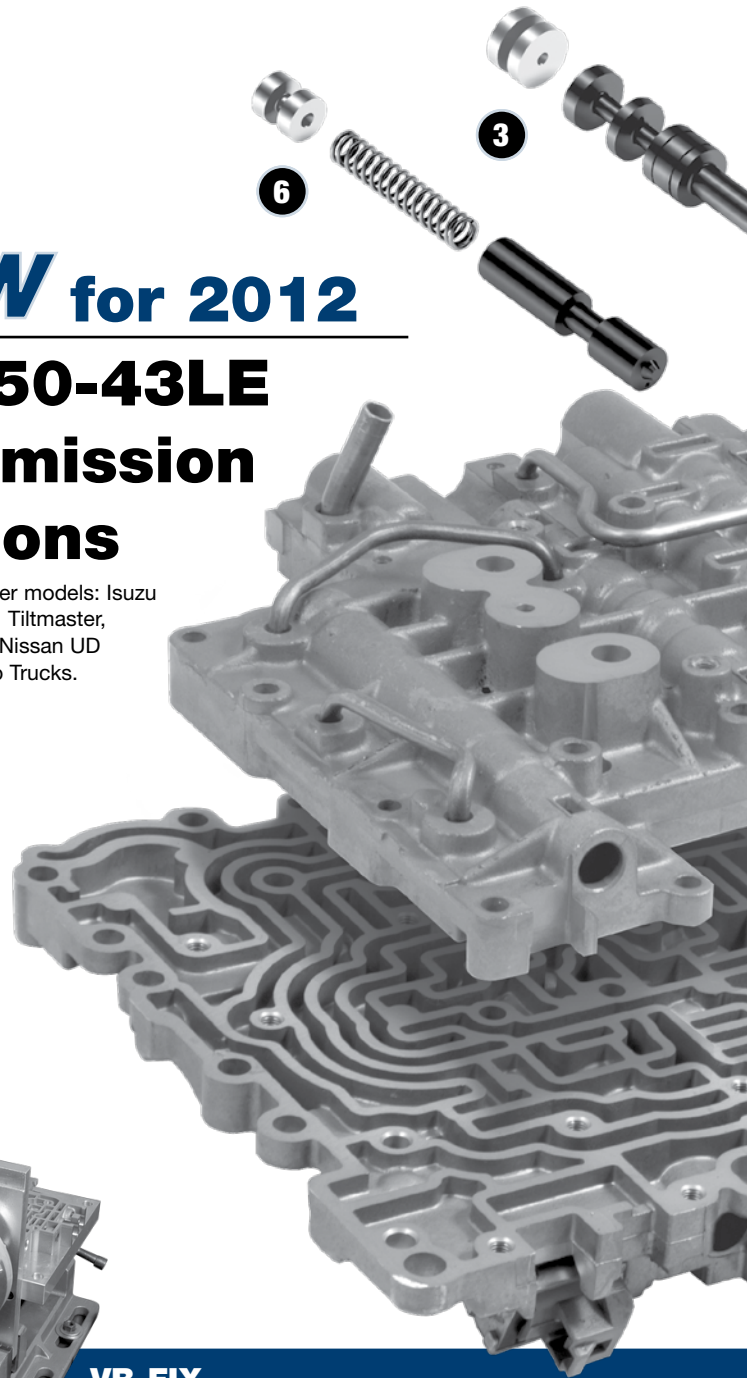
sonnax®
ROADSHOW

Valve body reaming and the VB-FIX are showcased in the popular Sonnax Roadshow seminar series. See the back page of this newsletter for details!

NEW for 2012

SIX 450-43LE Transmission Solutions

These kits fit '98-later models: Isuzu NPR, GMC Forward Tiltmaster, Chevrolet Forward, Nissan UD and Mitsubishi Fuso Trucks.



You Asked & Sonnax Delivered: New Valve Body Solutions!

Aisin AW TF-60SN, TF-80/81SC

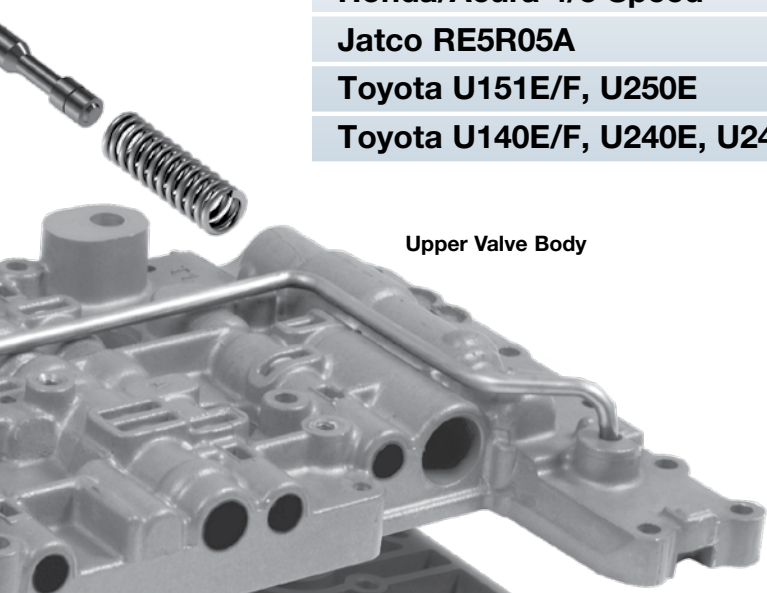
Aisin AW 55-50SN

Honda/Acura 4/5 Speed

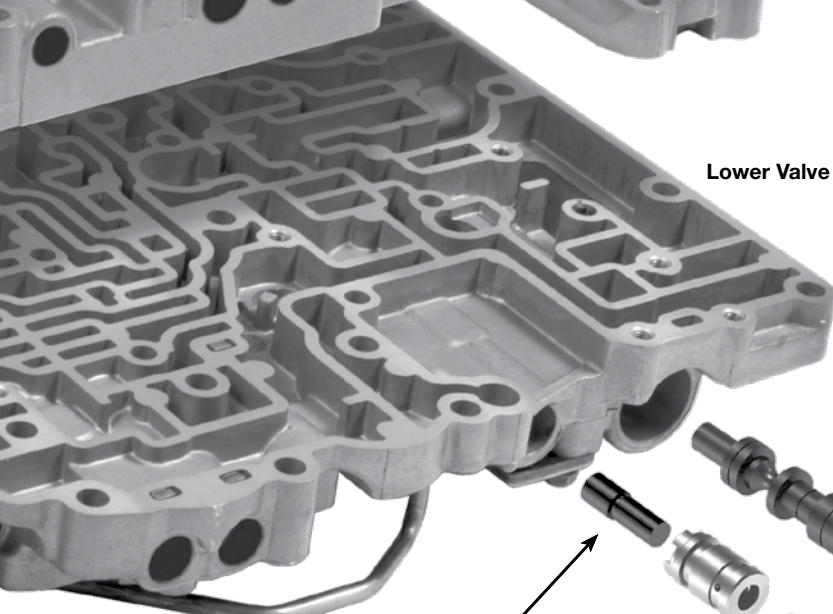
Jatco RE5R05A

Toyota U151E/F, U250E

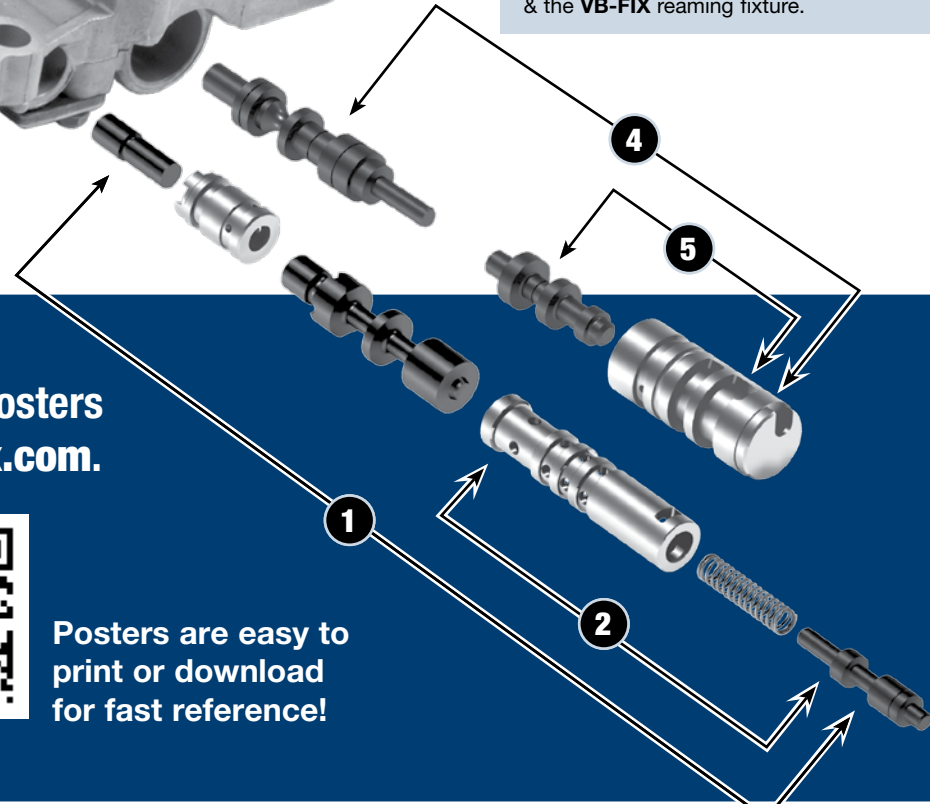
Toyota U140E/F, U240E, U241E



Upper Valve Body



Lower Valve Body



Nobody knows transmissions like Sonnax.™

4 94987-11K



Oversized PR Valve, Boost Valve & Sleeve Kit

Helps cure:

- High/Low line pressure
- Delayed engagements
- Soft and/or harsh shifts

Note: Requires tool kit **F-94987-TL11** & the **VB-FIX** reaming fixture.

5 94987-09K

Main Boost Valve & Sleeve Kit

Helps cure:

- Insufficient line rise
- Delayed engagement in Reverse
- Flare upshifts



6 94987-14K

Oversized Solenoid Modulator Valve Kit

Helps cure:

- Loss of 3rd & 4th gear
- No TCC apply
- Low line pressure

Note: Requires tool kit **F-94987-TL14** & the **VB-FIX** reaming fixture.

View more valve body posters
& parts at www.sonnax.com.

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with your
smartphone
to view all 21
Sonnax valve
body posters.



Posters are easy to
print or download
for fast reference!



got solenoids?

Turn your unwanted solenoid cores into **CASH!**

Sonnax **BUYS** the following cores:

- Chrysler (early & late) 45RFE/545RFE/68RFE
- Chrysler 62TE
- Ford 5R55N/W/S*
- Ford E4OD/4R100*
- Honda Dual Linear

*Both OE & remanufactured

How it works:

1. Collect Cores

Five or more cores is recommended.

2. Contact Sonnax

Sonnax sets up a Return Authorization.

3. Ship Your Cores

Sonnax pre-pays all shipping charges and provides labels.

4. Get Paid!

Sonnax sends you a check in the mail.

Visit
www.sonnax.com
to start your core
return online, or call
(800) 843-2600 TODAY!

Sonnax's remanufactured solenoid program continues to grow in product & reliability.

These high-quality remanufactured solenoids go through extensive disassembly, the addition of new components and a controlled rebuild process, then a rigorous inspection and testing procedure.

All of these steps ensure that you are getting an OE-level of operation for smooth, consistent shifting and extended service life at a reasonable cost.

Today there are seven Sonnax solenoid models available, with more product in development!

Chrysler 45RFE/545RFE/68RFE

- Ability to function at higher line pressure
- Direct replacement, no need to purchase separate TRS selector plate
- Includes solenoid spacer found in Sonnax solenoid repair and spacer kit 44836-01K

Part No. **44836**

Fits '99-'03, Early Style

Part No. **44836A**

Fits '04-Later, Late Style



Late



Early

Chrysler 62TE

- Sonnax spacer block installed to prevent intermittent code issues
- New Viton® O-rings
- New springs
- Rebuilt and tested pressure switches

Part No. **132420-A**



Ford 5R55N/W/S

- No-hassle direct replacement
- Improved design over OE
- New integrated circuit board
- New Viton® O-rings

Part No. **56954L** Fits W/S '04-Later

Part No. **56954K** Fits 5R55W/S '02-'03



Part No. **56954N**

Fits 5R55N '99-Later

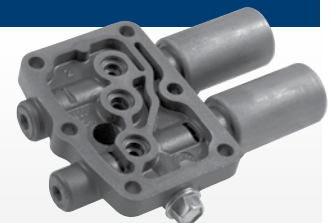
These solenoids are all Patent Pending.

Honda/Acura 5-Speed

- Oversized anodized aluminum valves
- New Viton® O-rings
- New springs
- Mounting surface is machined for flatness

Part No. **98990-A**

This solenoid fits Accord V6 (BAYA, MAYA) '03-later, MDX (BGHA, MGHA) '01-'02, Odyssey (BYBA) '02-'04, 32TL (B7WA, M7WA) '00-'04.





Simple, Drop-In Parts

Install Quickly & Easily Without Special Tools

Stops Hydraulic Leaks

So the Valve Body Works the Way It Should

In-Depth Tech Booklet

For Installation, Testing & Diagnostics;
Helps Determine if Further Repairs are Needed

Aisin AW 60-40LE (AF-13) *New!*

Aisin AW 60-41SN (AF-17) *New!*

Ford 4/5R44E, 4/5R55E

Toyota U140E/F, U240E, U241E

Toyota U151E/F, U250E

ZF6HP19/26/32, Ford 6R60/80

ZF6HP21/28/34 *New!*



More Zip Kits coming soon!
Visit www.sonnax.com for details.

Koyo/Torrington® Bearing Notice

Koyo® The automotive aftermarket has long been familiar with Torrington bearings. Although most people know that

Torrington is a company that manufactures these bearings, the term “Torrington bearing” has become synonymous with needle roller thrust bearings. “Torrington bearing” has become a generic term describing a type of bearing as much as it indicates a manufacturer who produces those bearings.

The Torrington Company was established in 1898 in Torrington, Conn. It was an independent company until an acquisition by Ingersoll Rand Corp. in 1968. In 2003, Torrington Bearing was sold to the Timken Company, which produced Torrington brand bearings until 2009. In 2009, JTEKT Corporation of Japan acquired the Torrington bearing line – including the manufacturing plants and tech center along with 3,400 employees – from Timken. Torrington became part of the JTEKT’s Koyo Bearings.

Throughout these changes in ownership, the Torrington brand remained the unquestioned leader in needle roller bearings to the automotive and industrial markets, and Sonnax has proudly supplied Torrington bearings to our customers for many years.

As part of the Torrington sale by Timken to JTEKT, Koyo was permitted to use the Torrington brand name for three years. At the end of 2012, that three-year agreement expires and these products formerly known as Torrington bearings will be marketed solely under the Koyo brand name. Despite the Torrington brand name reverting to Timken, these Koyo bearings are the same OE Torrington products, produced by the same people, using the same processes, in the same U.S. factories.

Koyo Bearing is the Torrington legacy, and you can count on Sonnax providing you with the same great OE quality you’ve always received under the Torrington brand....only the name has now changed to Koyo.