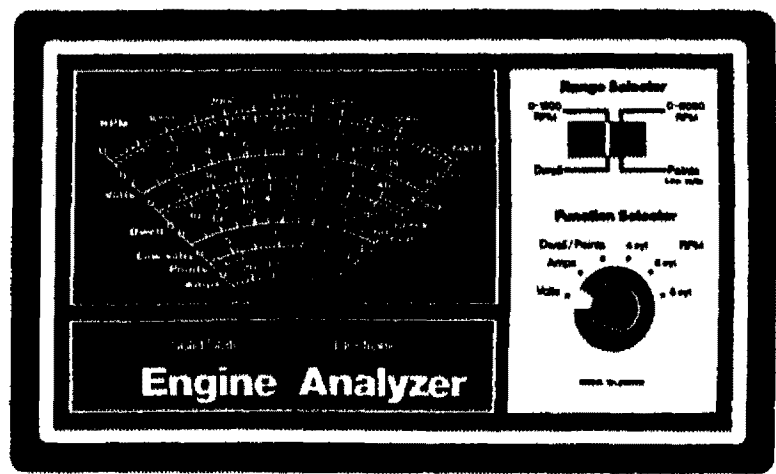


2-168302
SEARS
owners
manual

MODEL NO.
161.216300

Caution:
Read Rules For
Safe Operation
and Complete
Operating Test
Procedures
Carefully



ENGINE ANALYZER

FOR 12 VOLT SYSTEMS

OPERATING INSTRUCTIONS

SAFETY RULES

TUNE-UP PROCEDURES

REPAIR PARTS

SEARS, ROEBUCK AND CO. U.S.A.
CHICAGO, ILLINOIS 60684

RULES FOR SAFE AUTOMOTIVE TESTING

WARNING — READ CAREFULLY

Read this Operation Manual and these Rules for Safe Automotive Testing carefully. Failure to follow instructions and safety rules could result in serious bodily injury and/or damage to the instrument.

1. Before starting the engine, set the parking brake and place the gear selector in NEUTRAL on standard transmissions and PARK on automatic transmissions.
2. The carbon monoxide in exhaust gas is highly toxic. To avoid asphyxiation, always operate vehicle in a well-ventilated area. If vehicle is in an enclosed area, exhaust should be routed directly to the outside via leak-proof exhaust hose.
3. An automobile battery is capable of producing very high currents. Therefore, exercise reasonable care when working near the battery to avoid electrical connections through tools, wristwatch, etc.
4. Avoid contact with battery electrolyte. Electrolyte can burn holes in clothing, burn skin and cause permanent damage to eyes. Always wear splash-proof safety goggles when working around the battery. If battery electrolyte is splashed in the eyes or on skin, immediately flush the affected area for 15 minutes with large quantities of clean water; in case of eye contact, seek medical aid immediately.
5. The gases generated by a charging battery are highly explosive. Do not smoke or permit flame or spark to occur near a battery at any time, particularly when it is charging. Any room or compartment containing charging batteries should be well ventilated to prevent accumulation of explosive gases. To avoid sparks, do not disturb the battery charger connections while battery is charging, and always turn charger off before disconnecting the battery clips. When removing or reconnecting battery cables, make sure ignition switch and all accessories are turned off. A technique used by many mechanics is to carefully blow across the top of the battery to remove any hydrogen gas accumulation before connecting or disconnecting battery clips.
6. Never add acid to a battery once the battery has been placed in service; doing so may result in dangerous spattering of electrolyte.
7. Keep hands, hair, necktie, loose clothing and test leads well away from fan blades, fan belt, power steering belt, air conditioner belt and other moving engine parts as serious injury could result from entanglement.
8. Do not touch hot exhaust manifold, radiator or high-voltage spark plug and coil terminals. Spark voltages are not normally lethal, but an involuntary jerk of the hands or arms caused by electrical shock may result in injury.
9. Never look directly into carburetor throat while engine is cranking or running. A sudden backfire can cause serious burns.
10. To avoid the possibility of a flash fire, do not smoke or permit flame or spark to occur near carburetor, fuel line, fuel filter, fuel pump or other potential sources of spilled gasoline or gasoline vapors.
11. Never remove radiator cap while the engine is hot. Hot coolant escaping under pressure can cause serious burns.
12. The jack supplied with the vehicle should be used only for changing wheels. Never crawl under car or run engine while vehicle is on jack.
13. When making electrical test connections to the vehicle, do not use the carburetor or other fuel system components as a ground connection, as a spark could ignite the gasoline vapors and cause a fire or an explosion.
14. Do not let test cables rest or fall on or near hot or moving engine parts.
15. Use caution when disconnecting ignition cables. Pull cables carefully at the boot with the proper tool.

IMPORTANT

THIS MANUAL PRESENTS COMPLETE HOOKUP INSTRUCTIONS FOR THE SEARS 161.2163 ENGINE ANALYZER. IT ALSO DESCRIBES MANY OF THE TESTS THAT THIS INSTRUMENT IS CAPABLE OF PERFORMING AS WELL AS WHEN THEY SHOULD BE USED BASED ON VEHICLE PERFORMANCE, TUNE-UP OR TROUBLE ENCOUNTERED. CONSULT YOUR VEHICLE SERVICE MANUAL FOR SPECIFIC TUNE-UP INFORMATION AND TEST PROCEDURES. FOLLOW THE MANUFACTURER'S SPECIFICATIONS AND TEST PROCEDURES FOR ADJUSTING DWELL ANGLE AND IDLE SPEED, ESPECIALLY ON VEHICLES WITH MODERN ELECTRONIC IGNITION AND EMISSION CONTROLS. DO NOT ATTEMPT TO SERVICE A VEHICLE WITHOUT THE MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

VEHICLE MANUAL, SOURCES FOR SERVICE INFORMATION.

The following is a list of publishers who have service manuals for your specific vehicle at nominal cost. Write to them for availability and prices, specifying the make, style, and model year of your vehicle.

American Motors Corporation
Myriad
8835 General Drive
Plymouth Township
Michigan 48170

Chrysler Corporation
Dymont Distribution Service
Service Publication
20026 Progress Drive
Strongsville, Ohio 44136

Ford Publication Department
Helm Incorporated
Post Office Box 07150
Detroit, Michigan 48207

Buick
Tuar Company
Post Office Box 354
Flint, Michigan 48501

Oldsmobile
Lansing Lithographers
Post Office Box 23188
Lansing, Michigan 48909

Cadillac, Chevrolet, Pontiac
Helm Incorporated
Post Office Box 07130
Detroit, Michigan 48207

**OTHER SOURCES - Nonfactory
Domestic and Import Cars**
Chilton Book Company
Chilton Way
Radnor, PA 19089
Cordura Publications
Mitchell Manuals, Inc.
Post Office Box 26260
San Diego, CA 92126
Motor's Auto Repair Manual
Hearst Company
250 W 55th Street
New York, N Y 10019

ENGINE ANALYZER CONTROLS, CONNECTIONS, AND ACCESSORIES

DESCRIPTION. The Model 161.2163 Engine Analyzer has a clearly labeled meter and controls as shown in the Master Hookup diagram, Figure 1 below.

① METER

This meter displays the following scales:

- RPM 0-6000
0-1200
- Volts 0-16
- Dwell 0-45 degrees (8 cylinder)
0-90 degrees (4 cylinder)
0-60 degrees (6 cylinder)
GM C-3 system Mixture Control
Duty Cycle Solenoid also uses the
0-60 degrees scale.
- Low Volts 0-3.2
- Points OK/Bad/Open
- Amps 0-100

② METER ZERO ADJUSTER

Before connecting any leads to the engine, rotate the adjuster slowly with a screwdriver until the pointer is on zero.

③ FUNCTION SELECTOR

This selects the Volts, Amps, Dwell/Points, and 4, 6, or 8 cylinder RPM functions of the analyzer.

④ RANGE SELECTOR

This selects the Dwell or Points/Low Volts functions of the analyzer, as well as the 0-1200 or 0-6000 RPM ranges.

⑤ BATTERY LEAD

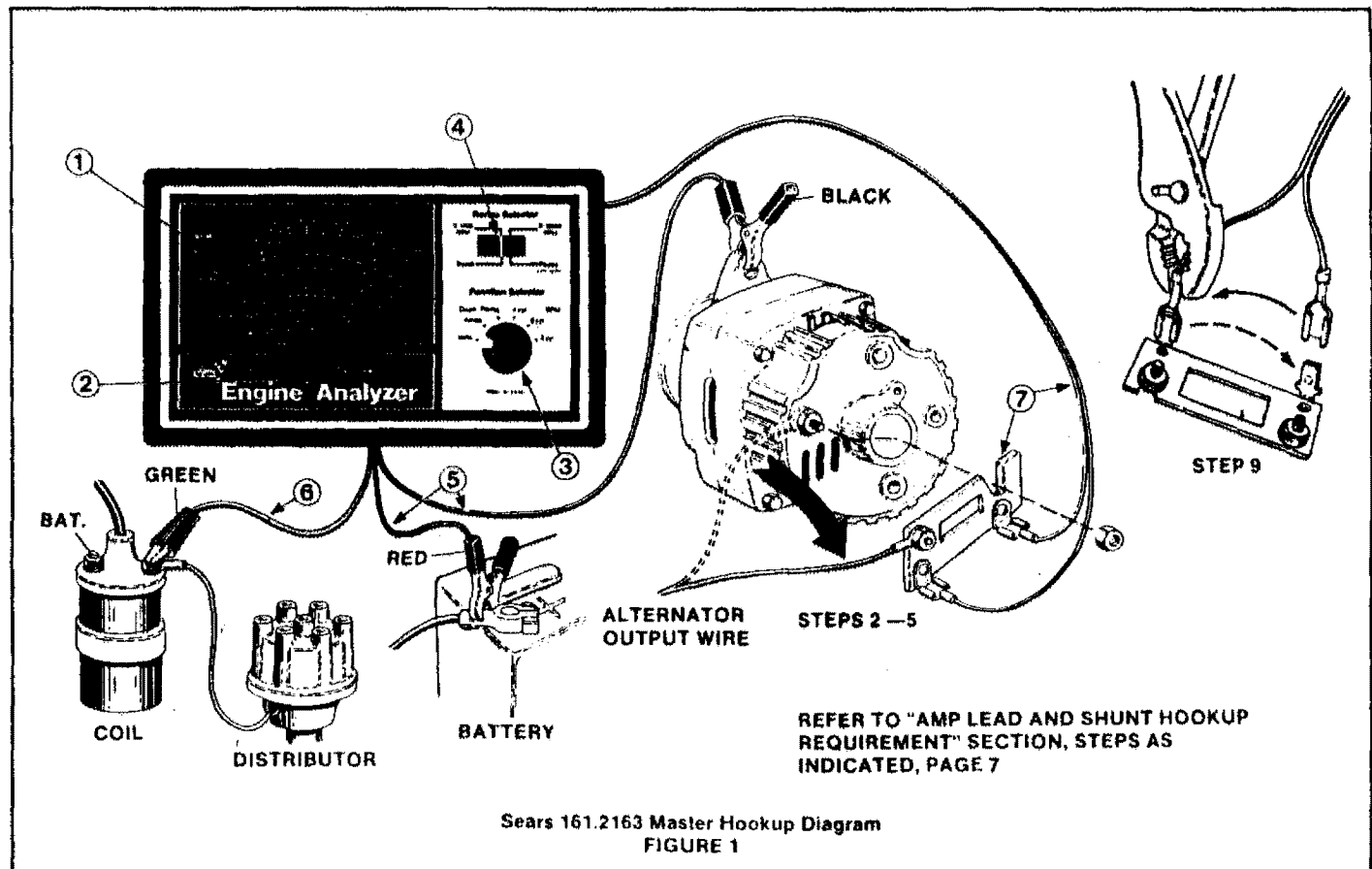
The Red clip is connected to the positive (+) battery terminal, and the Black clip is connected to a clean, secure engine ground. For safety reasons, do not use the negative (-) battery terminal or any fuel system components for ground connections. Vapors or gasses in these areas can cause an explosion if a spark occurs during connection. The Red and Black clips should be connected as shown for all tests.

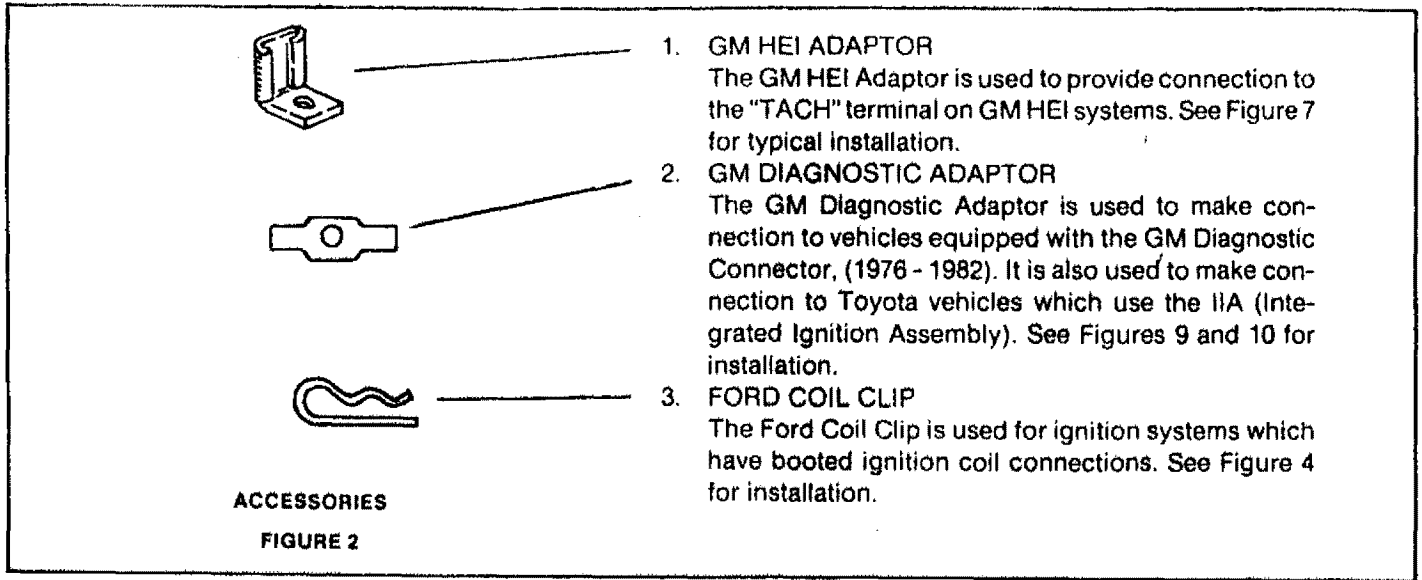
⑥ DWELL/RPM/C-3/POINTS/LOW VOLTS LEAD

The Green clip is used for measuring Dwell, RPM, General Motors C-3 Mixture Control Solenoid Duty Cycle, Points Resistance, and Low Volts. For Dwell, RPM and Points Resistance testing, connect this clip to the negative (-) side of the ignition coil in Figure 1 and 3 through 10. Connections for other tests will be shown and described in specific test procedures.

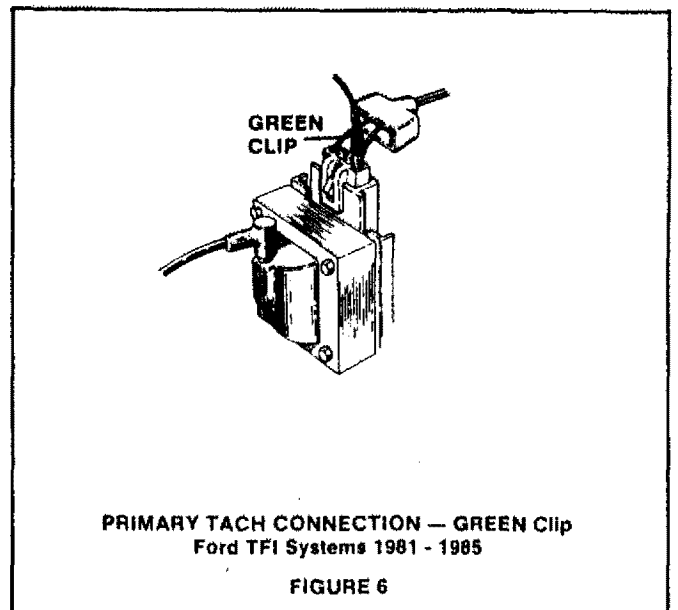
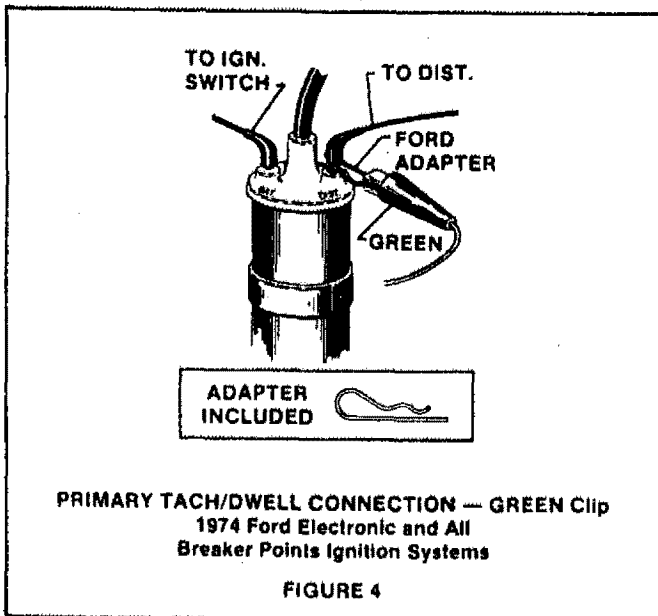
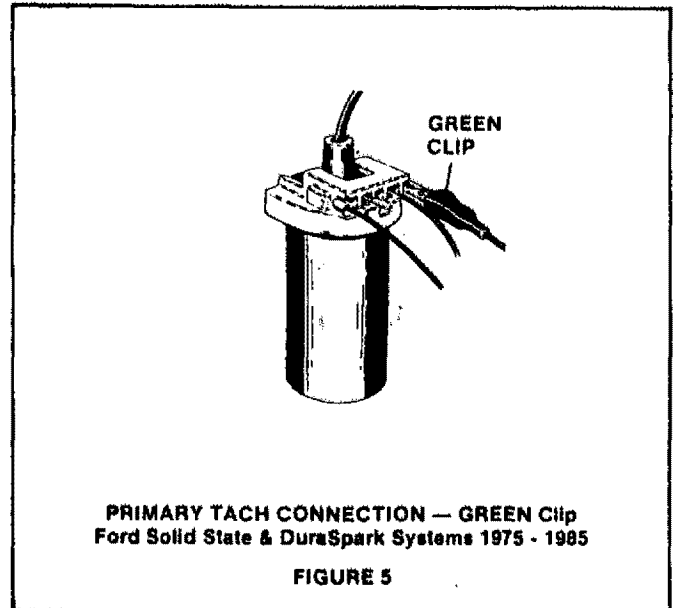
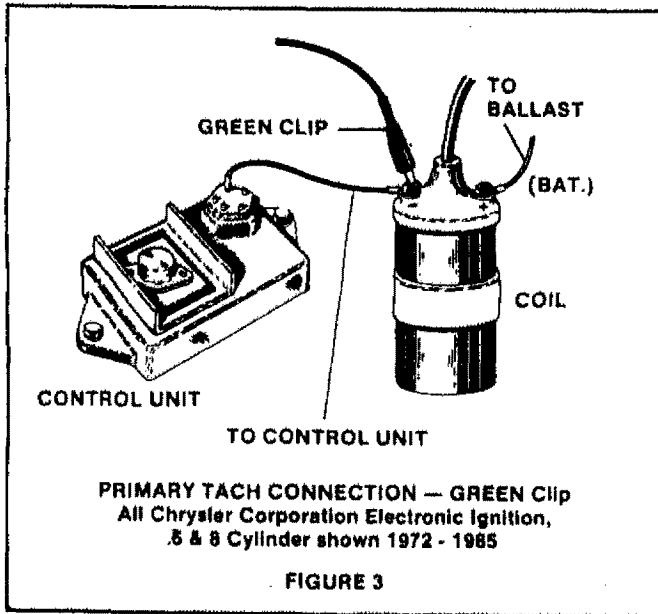
⑦ AMPS LEAD AND SHUNT

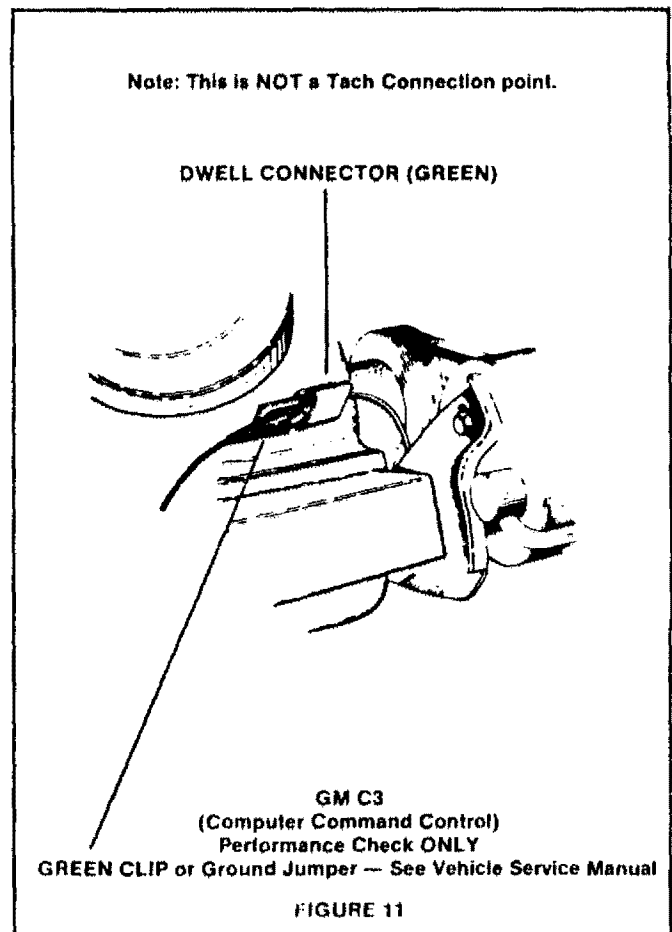
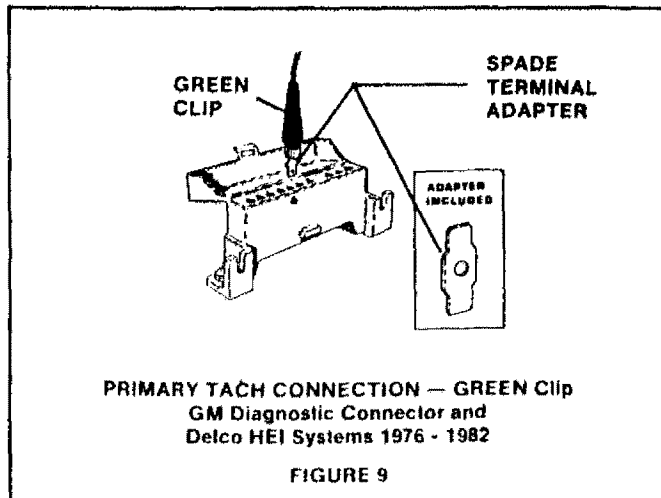
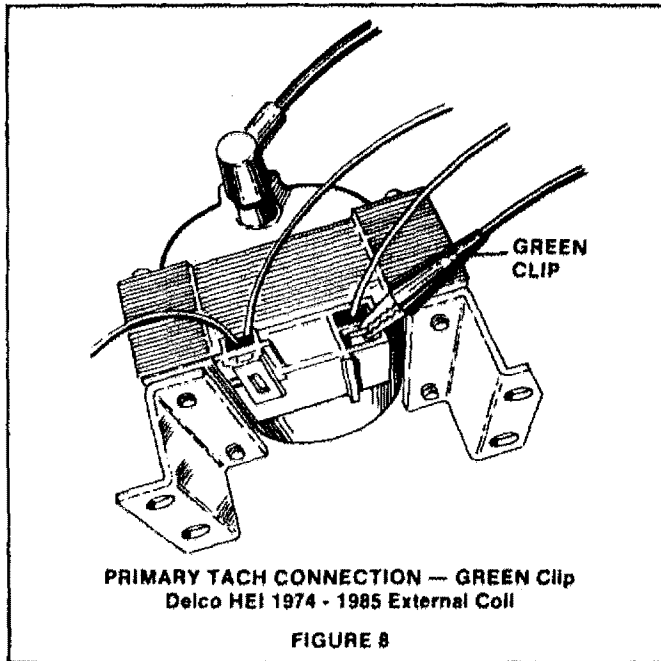
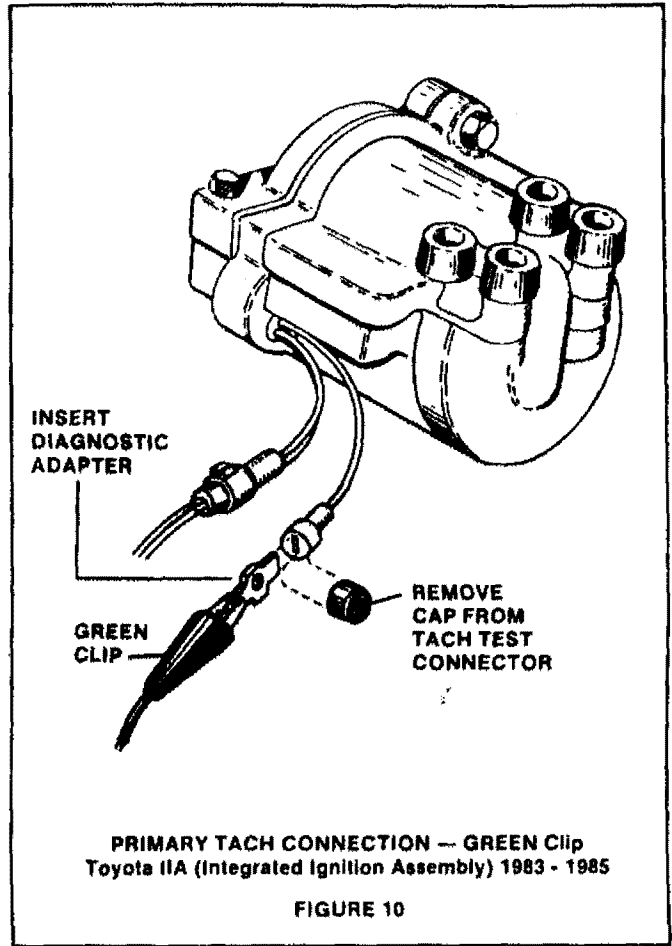
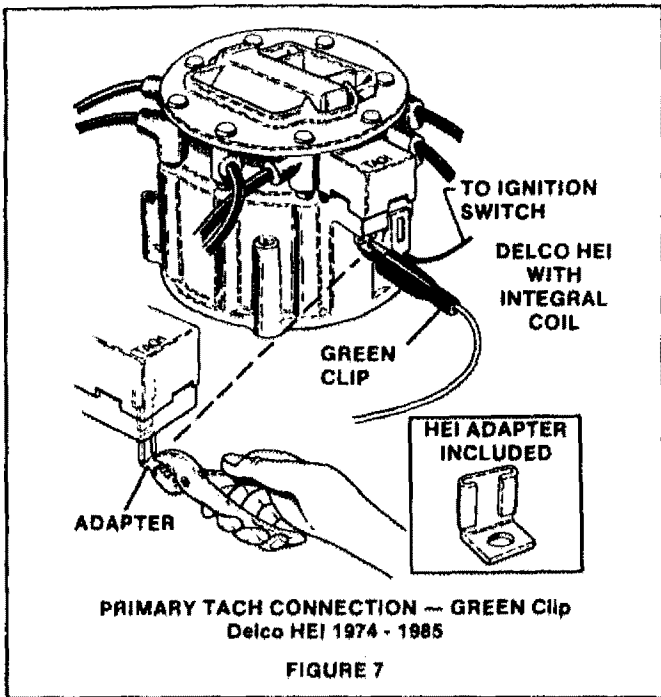
The Amps Lead and shunt are used for measuring alternator output. To maintain simplicity in overall analyzer usage, connect this lead only when measuring alternator output, page 7, "AMP LEAD AND SHUNT HOOKUP REQUIREMENT"





PRIMARY TACH CONNECTIONS





ELECTRICAL SYSTEM— PRELIMINARY CHECKS

INTRODUCTION. Before performing any electrical system tests, carefully read the following information. These checks will help you to identify the more common electrical system problems and will serve as a general guide for making electrical system tests.

VEHICLE CHECKS.

- A. CONSULT THE VEHICLE MANUAL OF THE VEHICLE BEING TESTED FOR SPECIFIC VOLTAGE AND CURRENT SPECIFICATIONS AND TEST PROCEDURES.
- B. Check the fan belt; tension it according to the manufacturer's specifications.
- C. Check the generator or alternator pulley and mounting bolts. They should be tight. Make sure that the charging and cranking system wiring and the battery cables are in good condition and that connections are clean and tight. Make sure that the battery is clean and that the liquid level in each cell is above the plates on vent-cap style batteries or that the green "eye" is visible on maintenance-free batteries.
- D. Check the "CCA" (Cold Cranking Amps) rating of the vehicle battery, often listed on the battery. This number should **equal or exceed** the specification given by the manufacturer for the vehicle's engine. If the battery capacity is too small, a cold engine may crank slowly or not at all on very cold days. If specifications are not available, the following method may be used to determine the recommended battery capacity:
 - **8 CYLINDER ENGINES.** The cubic inch displacement (CID — not liters) equals the Cold Cranking Amp requirement. For example, a 350 cubic inch displacement engine equals a 350 CCA minimum. For cold climates, add 20% of the cubic inch displacement to the CCA. Therefore, $350 \times .2$ (20%) = 70. $350 + 70 = 420$. A 420 CCA or greater rated battery should be used.
 - **6 CYLINDER ENGINES.** Calculate the cubic inch displacement per cylinder and multiply by 8. For example a 231 cubic inch displacement 6 cylinder engine = 38.5 cubic inch displacement per cylinder. Then, $38.5 \times 8 = 308$ CCA minimum. For cold climates, add 20% of the adjusted cubic inch displacement to the CCA. Therefore, $308 \times .2$ (20%) = 62. $308 + 62 = 370$. A 370 CCA battery or greater should be used.
 - **4 CYLINDER ENGINES.** Multiply the cubic inch displacement of the engine by 2. For example, a 151 cubic inch displacement engine $\times 2 = 302$ CCA. For cold climates, add 20% of the adjusted cubic inch displacement to the CCA. Therefore, $302 \times .2$ (20%) = 60. $302 + 60 = 362$. A 362 CCA or greater rated

- E. Check the alternator/generator output rating as listed on its color-coded tag or stamped on the alternator/generator frame. For example, 60A or 100A indicates a 60 Ampere or 100 Ampere alternator/generator. This rating should equal or exceed the manufacturer's specification for the vehicle as equipped. An alternator/generator which is electrically too small for the vehicle cannot charge a battery when the vehicle is run under heavy electrically loaded conditions (lights, HI fan, air conditioning etc.) The result could be a NO Crank/Start condition after prolonged operation under heavy electrical load conditions.
- F. Electrical specifications are generally given for an engine which is at normal operating temperature. If the engine is cold and will start, operate the engine at idle speed for at least 10 minutes before making any tests or until it is fully warm (upper radiator hose is hot). If the engine will not start and the cranking system tests must be made on a cold engine, cranking voltage may be slightly lower than specifications state.

CRANKING VOLTAGE AND BATTERY CONDITION

If the engine cranks slowly or not at all, the battery, cranking motor, and associated wiring may be at fault. Check the cranking voltage as indicated below.

1. Connect the analyzer to the vehicle as shown in Figure 1, and 3 through 10. The AMP LEAD AND SHUNT hookup is not necessary for this test.
2. Disable the engine from starting as explained in your vehicle service manual. See Figure 13.
3. Function Selector - Volts
4. Crank the engine while observing the 16 volt scale on the analyzer.
5. Normal Result - 9.6 volts or more at 70° F. Voltage will drop slightly as temperature decreases.
6. If the results are significantly out of specification consult your vehicle service manual for further diagnosis.
7. If battery voltage remains abnormally high (above approximately 10.5 volts) on a slow or no cranking engine, the problem may be loose or corroded connection(s) in the cranking circuit. Follow the procedure described below.

CRANKING CIRCUIT VOLTAGE LOSS TEST.

THE CRANKING CIRCUIT VOLTAGE LOSS TEST checks for voltage losses in the cranking system.

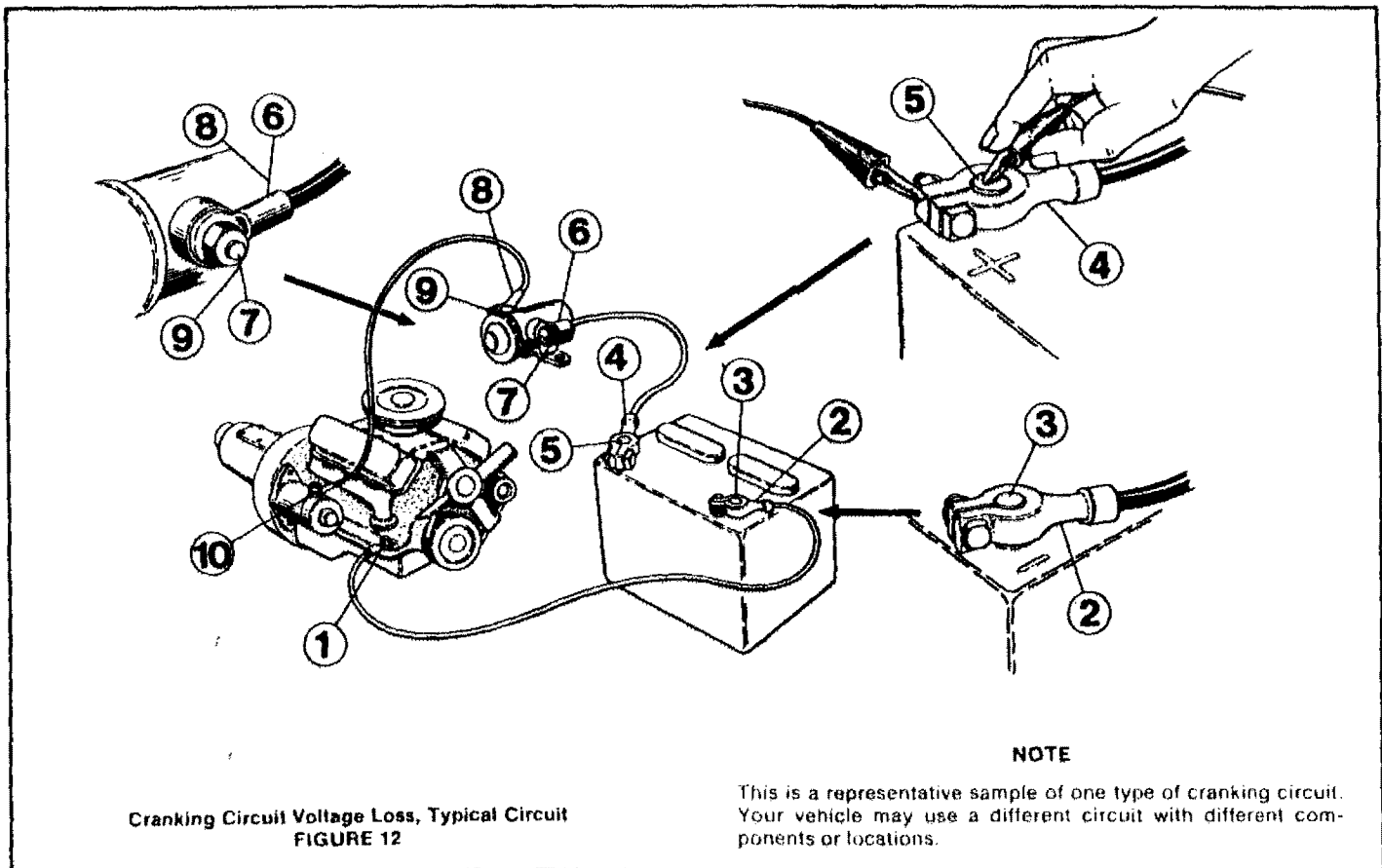
1. Perform the instructions listed under "Electrical System — Preliminary Checks."
2. Disable the engine from starting as explained in your vehicle service manual. See Figure 13.
3. Function Selector - Dwell/Points
4. Range Selector - Points/Low Volts
5. Use the Green and Black clips while referring to Figure 12. Connect the clips alternately between 1 and 2, 2 and 3, 4 and 5, 4 and 6, 6 and 7, 7 and 8, 7 and 9*, 8 and 9, and 8 and 10. Record the results at each point as read on the 3.2 volt scale of the meter with the engine cranking.
6. If the meter reads backwards (left of zero) during testing, reverse the Green and Black clip connections.
7. During this test, no reading should be higher than 0.2 volt.
8. To restart the engine, reverse the "Disabling Procedure."
9. If any reading is significantly higher than 0.2 volts,* check the cable or connections involved. Clean and tighten the connections. Replace broken, cracked or corroded parts when needed.

* The reading between 7 and 9, the starter solenoid voltage drop, may be a little higher than 0.2 volts and be satisfactory. Refer to your vehicle manual for specifications.

CHARGING SYSTEM VOLTAGE

It is the function of the charging system to keep the battery charged when the engine is running and to power the rest of the vehicle's electrical load requirement (ignition, lights, fan, etc). If this system fails, the result will be a discharged or possibly "dead" battery.

1. Connect the analyzer to the vehicle as shown in Figure 1, and 3 through 10. The AMP LEAD AND SHUNT hookup is not necessary.
2. Function Selector - Volts
3. Start the engine and allow it to warm to normal operating temperature. Operate it at curb idle.
4. With all accessories off observe the 16 volt scale on the analyzer.
5. Normal Result - 13.2 to 15.2 volts or as specified in the vehicle service manual.
6. Function Selector - RPM, 4, 6, or 8 cylinder to match engine under test.
7. Range Selector - 0-6000 RPM
8. Select a step on the fast idle cam which will maintain engine speed between 1800 and 2800 RPM, or have an assistant hold engine speed in this range. Hold this speed through Step 12.
9. Function Selector - Volts
10. Observe the 16 volt scale on the analyzer. The voltage should not have changed from Step 5 more than about .5 volts.
11. Load the electrical system by turning on the lights, HI fan, and wipers.
12. Observe the 16 volt scale on the analyzer. Voltage should not drop below about 13.0 volts.



13. Shut off all accessories, return the engine to curb idle, and shut it off.
14. If the results obtained in Steps 5, 10, or 12 are significantly different from those shown or vehicle service manual values, further diagnosis may be required: see your vehicle service manual.

AMP LEAD AND SHUNT HOOKUP REQUIREMENT

If the results obtained in the CHARGING SYSTEM VOLTAGE Test indicated a problem with the charging system, it may be necessary to measure the alternator output current to determine if the alternator is functioning properly. To do this, follow the test procedure as outlined in your vehicle service manual; since the procedure is unique to each vehicle.

To use the 2163 Sears Analyzer for the alternator output test, the following procedure describes the method of connecting the current shunt to the charging system.

1. Disconnect negative (-) battery cable.
2. Remove the alternator output wire(s) from the output terminal of the alternator.
3. Connect the removed wire(s) to the shunt as shown in Figure 1, using #10-32 x 1/2 to 3/4" hardware as shown.
4. Attach the slotted end of the shunt to the alternator output terminal.
5. Make sure all connections are clean and tight and that **NO PART OF THE SHUNT OR CONNECTIONS ARE TOUCHING VEHICLE GROUND.**
6. Re-connect the negative (-) battery cable.
7. Connect the remainder of the analyzer's leads to the vehicle as shown in Figures 1, and 3 through 10.
8. Function Selector - Amps
9. Perform the following steps to assure that the shunt is connected to the Amp Lead in the proper polarity.
 1. Engine off.
 2. Function Selector - Volts
 3. Observe the reading on the 16 volt scale of the analyzer.
 4. Start the engine. Wait a few moments and observe the reading on the 16 volt scale. If it is **higher** than Step 3, go to "A" below. If it is **lower** than Step 3, go to "B" below.

"A" Function Selector - Amps. Observe the meter pointer movement. If it is **above** the "O" at the left hand side of the meter scale, polarity is correct. If it deflects **below** "O", shut off the engine and reverse the "slip on" connections at the shunt. Be careful not to let pliers or shunt touch ground when reversing these connections.

"B" Function Selector - Amps. Observe the meter pointer movement. If it is **below** the "O" at the left hand side of the meter scale, polarity is correct. If it is **above** the "O", shut off the engine and reverse the "slip on" connections at the shunt. Be careful not to let pliers or shunt touch ground when reversing these connections.

10. Perform the charging system test procedure as described in your vehicle service manual. Switch the Function and Range Selectors to obtain other

MISCELLANEOUS VOLTAGE TESTS

This analyzer can perform many of the voltage tests called out in the vehicle service manual, such as voltages at lamp sockets, motors, solenoids and relays.

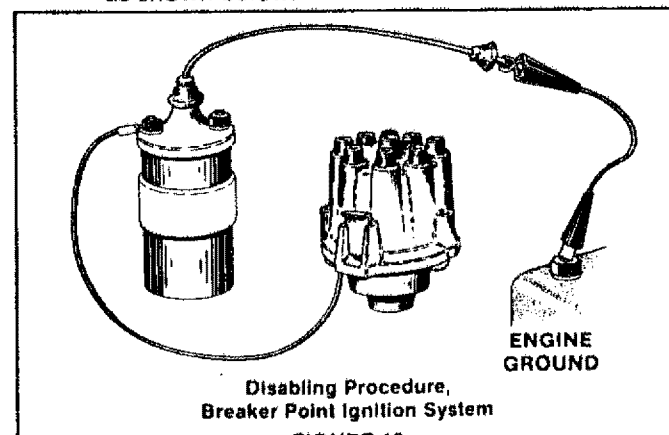
1. To measure voltage on the 16 volt scale:
 - Function Selector - Volts
 - Red clip - positive (+)
 - Black clip - negative (-) ground
2. To measure voltage on the 3.2 volt scale:
 - Function Selector - Dwell/Points
 - Range Selector - Points/Low Volts
 - Green clip - positive (+)
 - Black clip - Negative (-) ground

NOTE

The voltmeter functions of this instrument can be used anywhere the vehicle service manual calls for voltage measurement except in those applications which call for 10 Megohm input impedance or a digital voltmeter.

IGNITION SYSTEM TESTS

1. Primary Coil Voltage
 - (a) If the engine cranks normally, but does not start, a low voltage (or no voltage) may be measured at the coil primary (+ terminal). Look for poor (or no) connection to the ignition switch, wiring harness, or (bulkhead) connectors.
 - (b) If the engine starts, but dies immediately upon releasing the key, the ballast resistor may be open (or changed value). A full explanation for troubleshooting this problem will be found in your vehicle service manual.
2. Breaker Point Resistance Test (Breaker Point Systems Only).
Visually check the breaker point and associated wiring and connections. Check to see that the lead from the distributor to the Negative (-) terminal of the ignition coil is not damaged (nicked insulation etc.). Remove the distributor cap and inspect the breaker points. Properly adjusted breaker points become light gray in color in normal use. If they are blued, blackened or pitted, they have exceeded their normal life.
 - (a) To prevent the engine from starting, disable the ignition system by grounding the coil tower wire as shown below.



- (b) Connect the analyzer to the vehicle as shown in Figures 1 and 4.
- (c) Function Selector - Dwell/Points
- (d) Range Selector - Points/Low Volts

NOTE

When testing a vehicle with dual points, alternately block one set of points open with a piece of insulating material while the other set is being tested.

- (e) Turn the ignition key to the ON position. If the meter reads OPEN on the points scale, crank the engine a fraction of a revolution at a time until the meter reads in the left hand area of the scale.
- (f) The points are now closed.
A reading in the OK zone of the points scale indicates that the breaker points and associated wiring are in good condition. The Analyzer may indicate high point resistance on a new set of points until they have been run in the vehicle for a few miles and have been properly seated. This condition may be ignored as long as any defects discovered during the previous visual check have been corrected.
- (g) A reading in the BAD zone of the points scale may indicate defective points or any of the following faults may exist:
 - Poor distributor ground
 - Poor connection on the primary lead from the distributor to the ignition coil
 - Defective distributor pigtail lead
 - Misaligned points
 - Poor points/plate ground inside distributor
 Correct the defect and repeat the test.

3. Dwell Test And Adjustment (Breaker Point Systems Only or Transistorized Systems which Use Breaker Points).

Before performing the DWELL TEST AND ADJUSTMENT PROCEDURE, read the vehicle emission control label or the vehicle service manual to determine what should be done with the vacuum hoses connected to the distributor and the various advance/retard solenoids. Most often, the vacuum hose must be disconnected from the distributor and the end plugged with a plastic golf "tee" or other plug.

- (a) Connect the analyzer to the vehicle as shown in Figures 1 and 4.
- (b) Function Selector - Dwell/Points
- (c) Range Selector - Dwell
- (d) Start the engine and allow it to warm up (upper radiator hose hot).

Operate the engine at curb idle OR the RPM specified by the vehicle emission control label or the vehicle service manual for measuring dwell. Check the RPM by switching the FUNCTION SELECTOR to the appropriate RPM position to match the vehicle engine under test. Return the Function Selector to Dwell and observe the correct dwell scale.

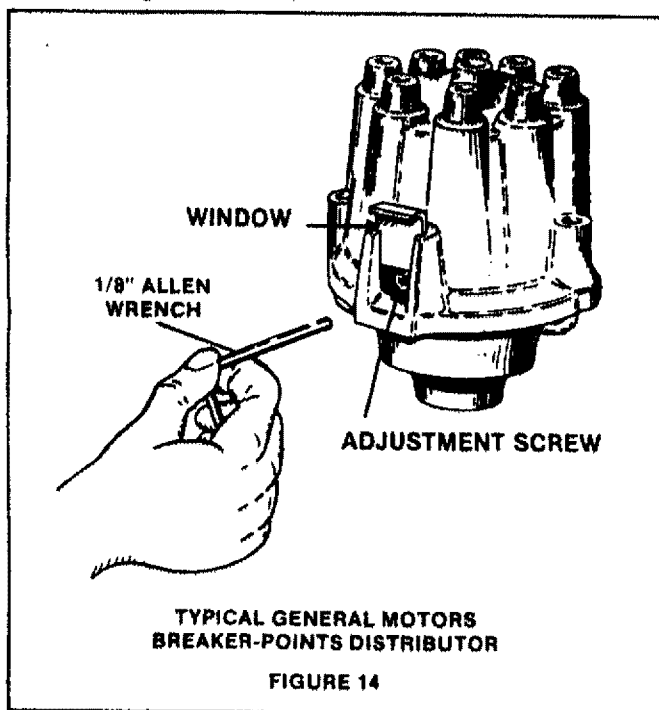
- (e) If dwell is within specification no adjustment is necessary.

NOTE

There is a direct relationship between dwell and timing. However, it is only a one way relationship. If you change the dwell angle of the breaker points, you will automatically change the ignition timing. Changing the timing, though, has no effect on the dwell angle. FOR THIS REASON, IT IS IMPORTANT TO RE-CHECK THE TIMING WHENEVER THE DWELL ANGLE HAS BEEN ADJUSTED.

DWELL ADJUSTMENT - CONVENTIONAL BREAKER POINT SYSTEMS

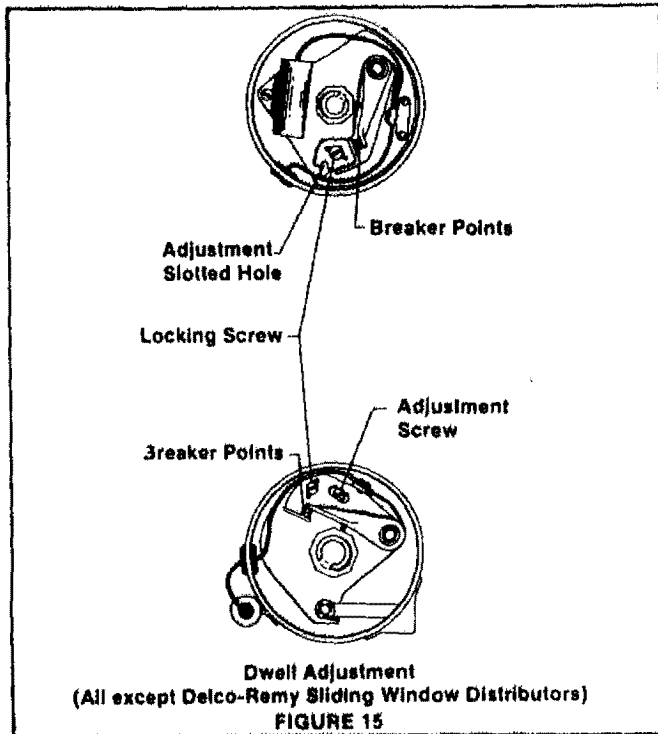
On GM distributors with a small metal slide cover, lift the cover and insert a 1/8" Allen wrench in the adjusting screw socket and adjust the dwell by turning the wrench, as shown in Figure 14.



On Ford, Chrysler, American Motors and other distributors not equipped with a small metal access slide cover, perform the following steps while referring to Figure 15.

1. Remove coil wire from center tower of distributor cap and ground the wire by connecting the loose end to the engine or frame.
2. Remove the distributor cap and rotor.
3. Connect a remote starter switch to the vehicle or have an assistant crank the engine for you.
4. With ignition switch ON and engine cranking observe reading on the Dwell scale.
5. To adjust Dwell, loosen the locking screw slightly and adjust the point gap with a feeler gauge according to the procedure outlined in the vehicle service manual. After adjustment, tighten locking screw, and recheck dwell while cranking engine. Repeat procedure if necessary. (Figure 15).

- Reassemble distributor and recheck dwell reading with engine operating at idle speed. Repeat steps 5 and 6 if necessary.



DWELL VARIATION TEST

- Follow the introductory paragraph and Steps a. through c. of Dwell Test and Adjustment, page 8.
- Start the engine and increase the engine speed from idle to about 1500 RPM and note the dwell angle. Return the engine speed to idle and again note the dwell angle. If the difference between the two dwell angle readings is more than 3 degrees, check for excessive wear in the breaker point plate and couplings or excessive wear in the distributor shaft gear and bushings.

FUEL SYSTEM TESTS

- General Motors C-3 (Computer Command Control) Mixture Control Solenoid Dwell - (Carburetor equipped vehicles only). The GM C-3 system controls Air/Fuel ratio with a mixture control solenoid in the carburetor. The basic system performance check of this system requires checking the duty cycle or "dwell" of the M/C solenoid. Note that regardless of the number of cylinders in the engine, the "dwell" reading is always read on the **6 cylinder dwell scale**.
- Connect the analyzer to the vehicle as shown in Figures 1, 7, 8, 9, and 11. Note that the Green Clip will have to be moved from the RPM connection point (Figures 7, 8, and 9) to the M/C Solenoid connector (Figure 11) during the test procedure when either RPM or Dwell measurement is specified. It will also be

Selector as follows:

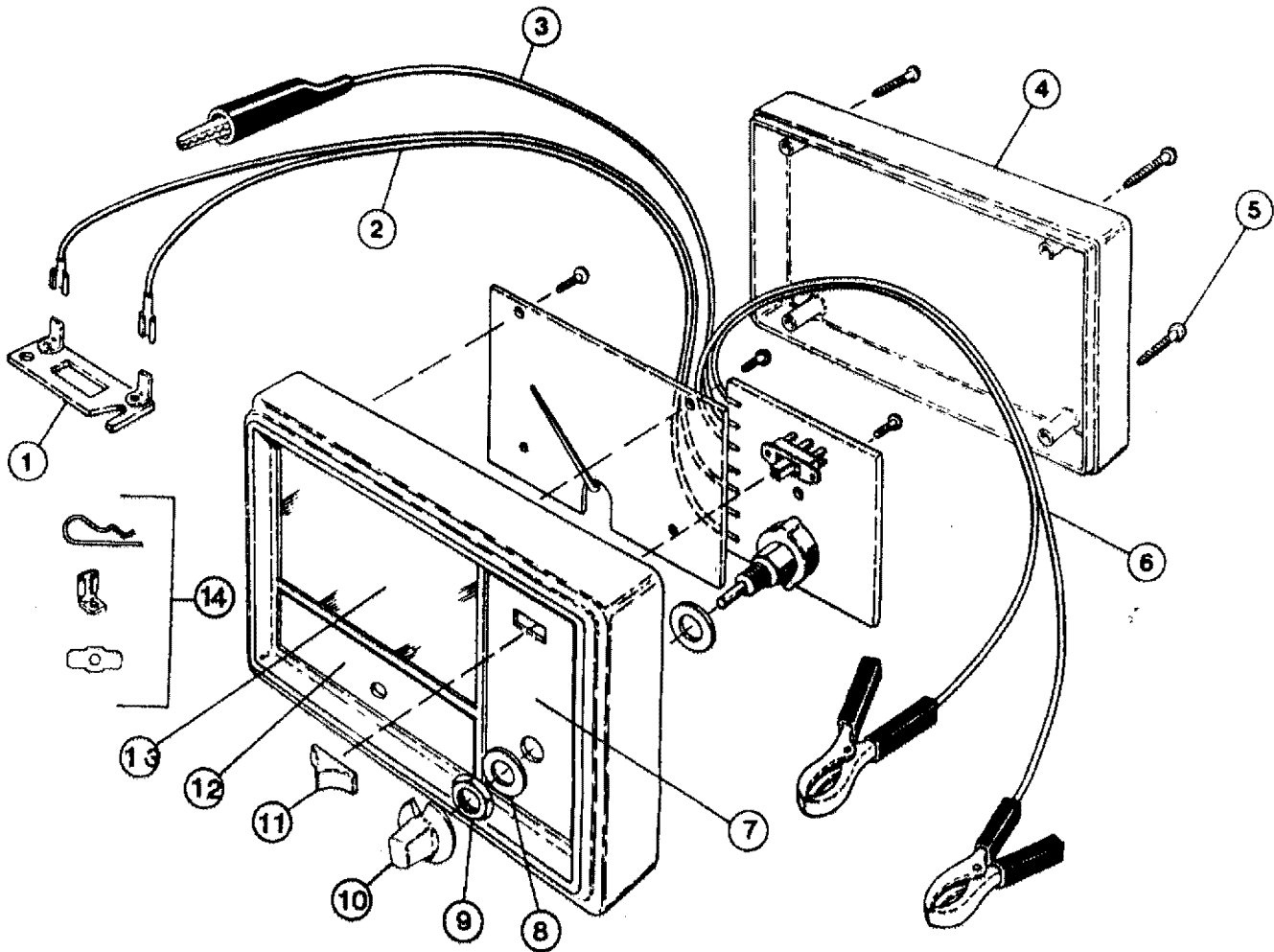
- For RPM measurement,
 - Function Selector - RPM (4, 6, or 8 cylinder to match the engine under test)
 - Range Selector - 0-1200 for idle RPM
0-6000 for High RPM
 - For M/C Solenoid dwell measurement,
 - Function Selector - Dwell/Points
 - Range Selector - Dwell
- Follow the test procedures as outlined in your vehicle service manual.

ENGINE RPM MEASUREMENT

- Connect the analyzer to the vehicle as shown in Figures 1, and 3 through 10.
- Function Selector - 4, 6, or 8 cylinder RPM position to match the vehicle under test.
- Range Selector - 0-1200 or 0-6000 depending on the engine speed to be measured.
- Carburetor Adjustments - There are several adjustments which should be checked as part of a performance tuneup. Those which require engine RPM monitoring are:
 - Curb Idle
 - Base Idle
 - Solenoid controlled Idle
 - Fast Idle

Your vehicle will likely have some combination of these adjustments. Proper adjustment of these settings is a requirement for good engine performance and drivability.

- Fuel Injection Adjustments - Some fuel injection systems have a minimum and maximum authority adjustment which should be checked during routine performance tuneup or whenever idle problems are encountered.
- Miscellaneous Engine Tests - Many of the test procedures in your vehicle service manual require the engine to run at a specific RPM during the test. Your instrument provides excellent monitoring capabilities for this purpose.



KEY NO.	PART NO.	DESCRIPTION
1	1000-252	Ampere shunt
2	38-728	Cable Assembly, Ampere shunt
3	38-729	Cable Assembly, Green Clip
4	400-861	Case, bottom
5	270-117	Screw, Case Self-tap. #6-20 x 1"
6	38-727	Cable Assembly, Red and Black clip
7	1-1065	Switch Decal
8	210-105	Flat Washer 3/8 I.D.
9	290-102	Nut -Hex. 3/8-32
10	450-128	Knob-Selector
11	450-133	Cap, Glamour
12	1-1064	Meter Decal
13	400-859	Window (Glass)
14	1000-425	Ignition Adapter Kit
*	2-168302	Instruction Manual (not illustrated)

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**owners
manual**

**MODEL NO.
161.216300**

**HOW TO ORDER
REPAIR PARTS**

ENGINE ANALYZER

Now that you have purchased your **ENGINE ANALYZER**, should a need ever exist for repair parts or service, simply contact any Sears, Roebuck and Co. stores. Be sure to provide all pertinent facts when you call or visit.

The model number of your **ENGINE ANALYZER** can be found on the front of the instrument.

**WHEN ORDERING REPAIR PARTS, ALWAYS
GIVE THE FOLLOWING INFORMATION:**

- PART NUMBER • PART DESCRIPTION
- MODEL NUMBER • NAME OF ITEM

All parts listed may be ordered from any Sears Service Center and most Sears stores.

If the parts you need are not stocked locally, your order will be electronically transmitted to a Sears Repair Parts Distribution Center for handling.