

## SECTION 2

# IGNITION SYSTEM

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### IDENTIFICATION

The distributor identification number is stamped on the distributor housing. The basic part number for distributors is 12127. To procure replacement parts, it is necessary to know the part number prefix and suffix (Figure 1).

Always refer to the Parts Catalog for parts usage and interchangeability before replacing a distributor or a component part for a distributor.

### DESCRIPTION AND OPERATION

The 302 and 351 industrial engines use a conventional ignition system.

The direction of distributor rotation is counterclockwise as viewed from the top of the distributor (including reverse rotation marine engines).

The spark plug wires are inserted in the distributor cap in the firing order of the engine. Reference page 1-04 for firing order and the spark advance chart in Specifications for tune-up data. Number one socket is identified by the number one on the cap. The cylinders are numbered from front to rear — right bank, 1-2-3-4, left bank, 5-6-7-8.

The distributor used on the 302 and 351 industrial engines is the dual advance type (Figure 3) with two independently operated spark advance systems. (Marine engines use a Prestolite distributor which is covered later in this section.)

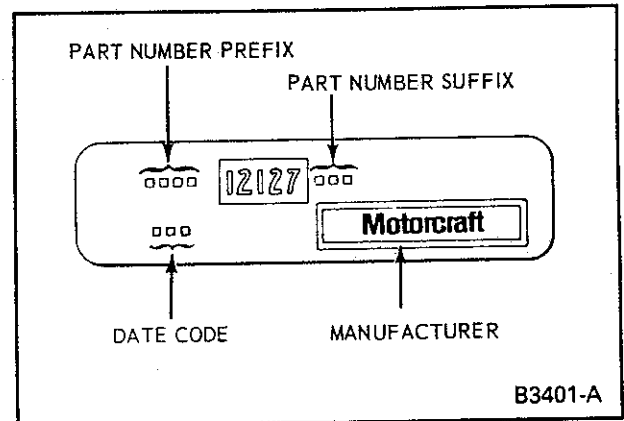


Figure 1 Distributor Identification (Industrial)

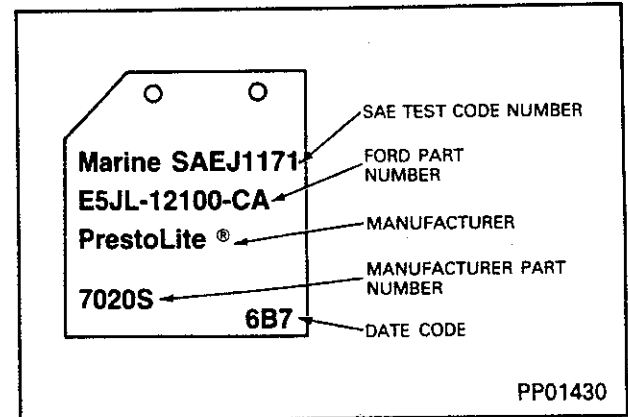


Figure 2 Distributor Identification (Marine)

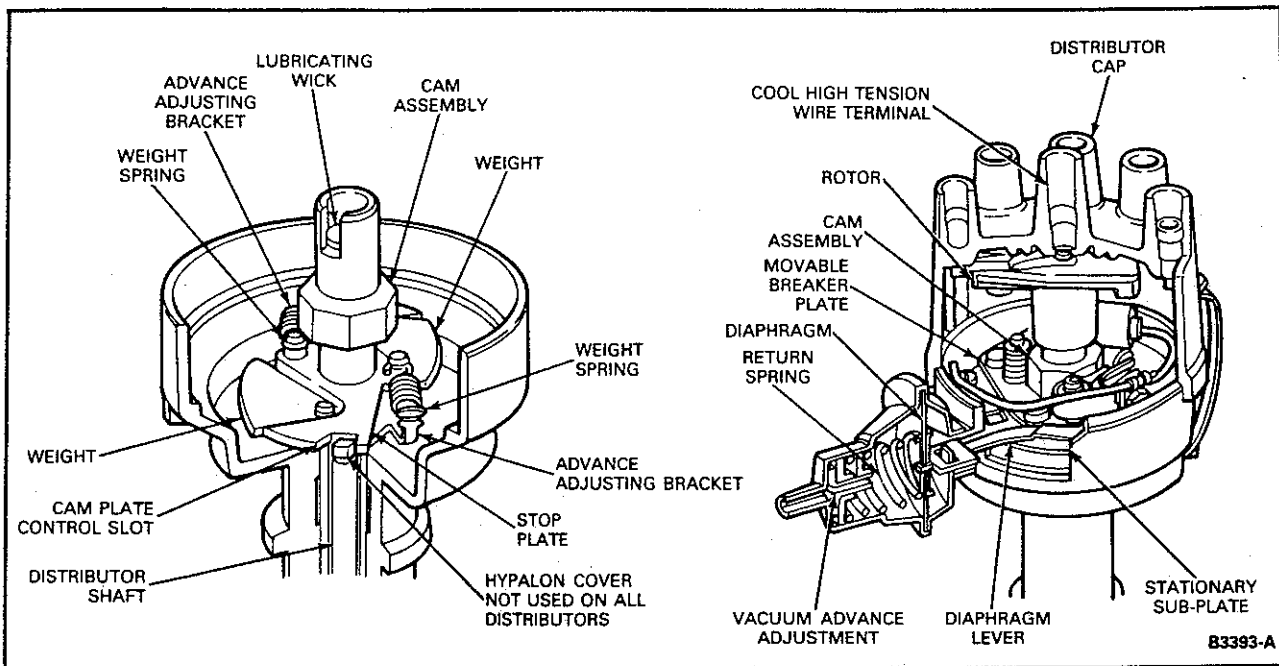


Figure 3 Dual Advance Distributor

A vacuum operated spark advance control diaphragm is located on the side of the distributor base. A centrifugal advance mechanism is located beneath the stationary subplate assembly.

The diaphragm is connected to the movable breaker plate by a link. An increase in vacuum will move the diaphragm against the advance diaphragm spring tension, causing the movable breaker plate to pivot opposite the distributor rotation. Thus, ignition timing is advanced, and this is calculated to occur during normal load operation, but not during deceleration or idle.

### CIRCUIT OPERATION

The ignition system consists of a primary (low voltage) and a secondary (high voltage) circuit (Figure 4).

The primary consists of the:

1. Battery.
2. Ignition switch.
3. Primary circuit resistor.
4. Primary windings of the ignition coil.
5. Breaker points.
6. Condenser.

The secondary circuit consists of the:

1. Secondary windings of the ignition coil.
2. Distributor rotor.
3. Distributor cap.
4. High tension (spark plug) wires.
5. Spark plugs.

When the breaker points are closed, current flows from the battery through the ignition switch to the primary windings in the coil, then

to ground through the closed breaker points. When the breaker points open, the magnetic field built up in the primary windings of the coil moves through the secondary windings of the coil, producing high voltage. **High voltage is produced each time the breaker points open.** The high voltage flows through the coil high tension lead to the distributor cap where the rotor distributes it to one of the spark plug terminals in the distributor cap. This process is repeated for every power stroke of the engine.

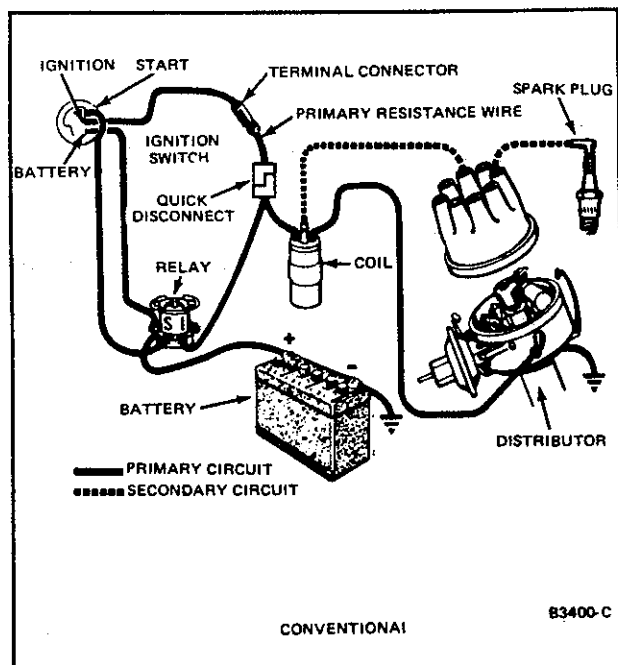


Figure 4 Typical Ignition System Circuits

## DIAGNOSIS AND TESTING

Ignition systems troubles are caused by a failure in the primary and/or the secondary circuit; incorrect ignition timing; or incorrect distributor advance. Circuit failures may be caused by shorts, corroded or dirty terminals, loose connections, defective wire insulation, cracked distributor cap or rotor, defective distributor points, fouled spark plugs, or by improper dwell angle.

If engine starting or operating trouble is attributed to the ignition system, start the engine and verify the complaint. On engines that will not start, be sure there is gasoline in the fuel tank and that fuel is reaching the carburetor. Then locate the ignition system problem by an oscilloscope test or by a spark intensity test.

### SPARK INTENSITY TESTS

#### Trouble Isolation

1. Connect an auxiliary starter switch in the starting circuit.
2. Remove the coil high tension lead from the distributor cap.
3. Turn on the ignition switch.
4. While holding the high tension lead approximately 3/16 inch from the cylinder head or any other good ground, crank the engine with an auxiliary starter switch.

If the spark is good, the trouble lies in the secondary circuit.

If there is no spark or a weak spark, the trouble is in the primary circuit, coil to distributor high tension lead, or the coil.

#### Primary Circuit

A breakdown or energy loss in the primary circuit can be caused by: defective primary wiring, or loose or corroded terminals; burned, shorted, sticking or improperly adjusted breaker points; an open or shorted coil; or condenser.

A complete test of the primary circuit consists of checking the circuit from the coil to ground, and the starting ignition circuit.

Excessive voltage drop in the primary circuit will reduce the secondary output of the ignition coil, resulting in hard starting and poor performance.

To isolate a trouble in the primary circuit, use a voltmeter and perform the following tests: Battery to Coil, Starting Ignition Circuit, Coil to Ground, or Breaker Points.

#### Secondary Circuit

A breakdown or energy loss in the secondary circuit can be caused by: fouled or improperly adjusted spark plugs; defective high tension wiring or high tension leakage across the coil, distributor cap or rotor resulting from an accumulation of dirt.

To check the spark intensity at the spark plugs, thereby isolating an ignition problem to a particular cylinder, proceed as follows:

1. Disconnect a spark plug wire. **Check the spark intensity of one wire at a time.**
2. Install a terminal adapter in the terminal of the wire to be checked. Hold the adapter approximately 3/16 inch from the exhaust manifold and crank the engine, using an auxiliary starter switch. The spark should jump the gap regularly.
3. If the spark intensity of all the wires is satisfactory, the coil, condenser, rotor, distributor cap and the secondary wires are probably satisfactory.

If the spark is good at only some wires, check the resistance of those particular leads.

If the spark is equal at all wires, but weak or intermittent, check the coil, distributor cap and the coil to distributor high tension wire. The wire should be clean and bright on the conducting ends, and on the coil tower and distributor sockets. The wire should fit snugly and be bottomed in the sockets.

### IGNITION SYSTEM TESTS

#### Battery to Coil Voltmeter Test

1. Connect the voltmeter leads as shown in Figure 5.
2. Connect a jumper wire to the distributor terminal of the coil and to a good ground on the distributor housing.
3. Turn the accessories off.
4. Turn the ignition switch on.
5. If the voltmeter reading is between 4.5 and 6.9 volts, the primary circuit from the battery to the coil is satisfactory.
6. If the voltmeter reading is greater than 6.9 volts, check the following:
  - The battery and cables for loose connections or corrosion
  - The resistance wire for damage
  - The primary insulation, broken strands, and loose or corroded terminals
  - The starter-relay-to-ignition switch for damage

If the voltmeter reading is less than 4.5 volts, the ignition resistor should be replaced.

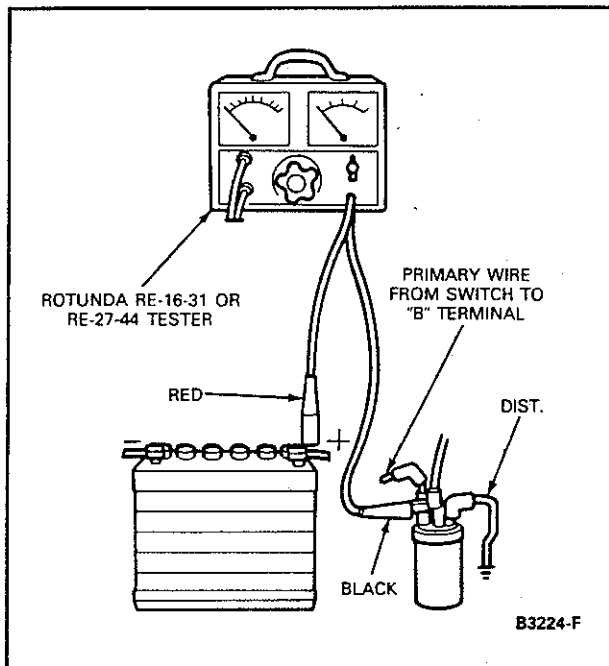


Figure 5 Battery-to-Coil and Starting Ignition Circuit Test

#### Starting Ignition Circuit Voltmeter Test

1. Connect the voltmeter leads as shown in Figure 5.
2. Disconnect and ground the coil to distributor high tension lead at the distributor.
3. With the ignition switch off, crank the engine with an auxiliary starter switch while observing the voltage drop.
4. If the voltage drop is 0.4 volt or less, the starting ignition circuit is satisfactory.
5. If the voltage drop is greater than 0.4 volt, clean and tighten the terminals in the circuit or replace the wiring as necessary.

#### Coil to Ground Voltmeter Test

1. Connect the voltmeter leads as shown in Figure 6.
2. Close the breaker points.
3. Turn all lights and accessories off.
4. Turn the ignition switch on.
5. If the voltmeter reading is 0.25 volt or less, the primary circuit from coil to ground is satisfactory.
6. If the voltmeter reading is greater than 0.25 volt, test the voltage drop between each of the following:
  - The coil and the breaker point connections of the coil to distributor primary wire
  - The movable breaker point and the breaker plate
  - The breaker plate and the distributor housing
  - The distributor housing and engine ground

7. Turn the ignition switch off. Disconnect the voltmeter leads.

#### Breaker Points Check

Clean and inspect the breaker points by following the procedure under Cleaning and Inspection, page 2-10.

The breaker point dwell can be checked with a distributor tester or a dwell meter by following the procedure under Distributor Tests.

The breaker point resistance can be checked with a distributor tester by following the procedure under Distributor Tests on page 2-05.

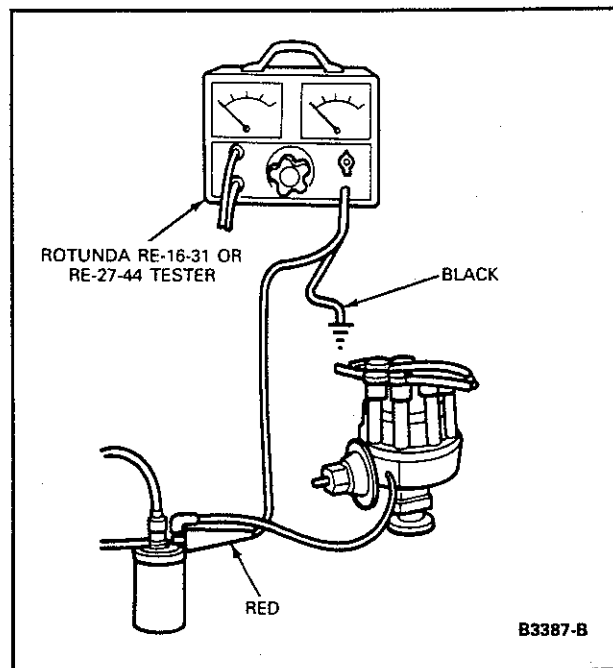


Figure 6 Coil-to-Ground Test

#### Coil Test

Check the coil on a coil tester following the manufacturer's instructions. Check for ohms resistance both primary and secondary. Also check the amperage draw both with the engine idling and stopped. These checks should all fall within specifications.

#### Secondary (High Tension) Wires Resistance Test

The secondary wires include the wires connecting the distributor cap to the spark plugs and the wire connecting the center terminal of the distributor cap to the center terminal of the ignition coil.

These wires are the radio resistance-type which filter out the high frequency electrical impulses that are the source of ignition noise interference. The resistance of each wire should not exceed 5000 ohms per inch. **When checking the resistance of the wires or setting ignition timing, do not puncture the wires with a probe. The probe may cause a separation in the conductor.**

When removing the wires from the spark plugs, grasp and twist the moulded cap, then pull the cap off the spark plug by hand only. Do not pull on the wire because the wire connection inside the cap may become separated or the insulator may be damaged.

To check the spark intensity at the spark plugs, proceed as follows:

1. Disconnect a spark plug wire. **Check the spark intensity of one wire at a time.**
2. Install a terminal adapter in the terminal of the wire to be checked. Hold the adapter approximately 3/16 inch from the exhaust manifold and crank the engine, using an auxiliary starter switch. The spark should jump the gap regularly.
3. If the spark intensity of all the wires is satisfactory, the coil, condenser, rotor, distributor cap and the secondary wires are probably satisfactory.

If the spark is good at only some wires, check the resistance of those particular leads.

If the spark is equal at all wires, but weak or intermittent, check the coil, distributor cap and the coil to distributor secondary (high tension) wires.

#### Spark Plug Test

Inspect, clean, file the electrodes and gap the plugs. After the proper gap is obtained, check the plugs on a testing machine. Compare the sparking efficiency of the cleaned and gapped plug with a new plug. Replace the plug if it fails to meet 70 percent of the new plug performance.

### DISTRIBUTOR TESTS — ON ENGINE

#### Test Connections for Dwell Angle Check

1. Disconnect the distributor primary wire at the coil. Connect a short jumper wire to the DIST terminal of the coil and the distributor primary wire. Connect the red lead to the jumper wire.
2. Connect the black lead to a good ground on the engine.

#### Dwell Angle Check

1. Disconnect and plug the distributor vacuum line. Connect the tester.
2. Turn the test control knob to the set position.
3. Adjust the set control knob until the needle on the dwell meter lines up with the set line.
4. Start the engine and let it idle.
5. Turn the test control knob to the 8 CYL position.
6. Read the dwell angle on the dwell meter and compare the reading to specifications.
7. Turn off the engine.

8. If the dwell angle was below the specified amount, the breaker point gap is too wide. If the dwell angle was above the specified amount, the breaker point gap is too close.

If the dwell is to specifications, turn the test selector knob to the OFF position and disconnect the tester leads and jumper wire; then connect the distributor vacuum line.

#### Dwell Angle Adjustment

If the dwell angle is not within specifications, proceed as follows:

1. Remove the coil high tension lead from the distributor and ground it.
2. Remove the distributor cap and place it out of the way. Remove the rotor.
3. Connect an auxiliary starter switch in the circuit.
4. Loosen the breaker point assembly retaining screw near the breaker point contacts.
5. With the ignition on, crank the engine with an auxiliary starter switch and adjust the gap to specifications.
6. Release the auxiliary starter switch and tighten the breaker point attaching screw.
7. Since the adjustment may have changed when the attaching screw was tightened, crank the engine again with the auxiliary starter switch and check the dwell. When the dwell is properly adjusted, remove the jumper wire, auxiliary starter switch and tester leads and install the rotor, distributor cap, coil high tension lead and starter relay wires. Connect the distributor vacuum line.

### DISTRIBUTOR TESTS — OFF ENGINE

#### Distributor Shaft End Play

If the shaft end play is not to specifications, check the location of the collar on the distributor shaft.

1. Remove the distributor from the engine.
2. Place the distributor in the holding tool and clamp it in a vise.
3. Push the distributor shaft downward as far as it will go, and check the end play with a feeler gauge placed between the collar and the distributor base. The end play should be within the specified limits. If the shaft end play is not specifications, check the location of the distributor shaft collar.

#### General Principles for Testing

The following instructions indicate the general principles to be followed for testing the distributor on a tester. The method of testing, however, may vary for machines of a different manufacture. For specific instructions refer to the equipment manufacturer's handbook.

1. Mount the distributor on the tester. Check that the distributor is free to rotate.
2. Make the necessary electrical connections and zero the instrument if required.
3. Tighten the drive chuck to the distributor drive shaft securely.
4. Rotate the drive chuck by hand to make sure the distributor shaft turns freely and then tighten the locking screw on the distributor support arm.
5. Connect the Synchograph test lead to the primary lead wire of the distributor.

#### Breaker Point Resistance

1. Turn the test selector to the position for checking resistance.
2. Rotate the chuck by hand until the distributor breaker contacts are closed.
3. The pointer on the cam angle meter should read in the OK zone of the meter scale. If the meter pointer does not fall in the OK zone, there is excessive resistance caused by a faulty contact across the distributor points, a damaged primary lead, or a poorly grounded base plate. A faulty contact across the distributor points indicates improper spring or burned or pitted points.

#### Insulation and Leakage

1. Turn the test selector to the cam angle position and rotate the chuck by hand until the distributor breaker contacts are open.
2. The cam angle meter should show a zero reading. If a zero reading is not obtained, a short circuit to ground exists.

A short could be caused by poor primary wire insulation, a shorted condenser or a short between the breaker arm and breaker plate.

#### Mechanical Operation

1. Manually check the advance mechanism by turning the rotor in the direction of distributor rotation and then releasing it. The rotor will return to its original position if the mechanism has freedom of movement and the springs are in good condition.
2. Make the necessary connections for the stroboscopic timing light or sparking protractor. (Refer to equipment manufacturer's handbook.)
3. Adjust the speed control to vary the distributor speed between 400 and 4000 engine rpm, or at the maximum speed of the engine on which the distributor is used. Erratic or faint flashes of light preceding the regular flashes as the speed of rotation is increased can be due to weak breaker arm spring tension or binding of the breaker arm on the pivot pin.

4. Operate the distributor at approximately 2500 engine rpm and move the protractor scale so that the zero degree mark on the scale is opposite one of the neon flashes. The balance of all the flashes should come within .1 degree, plus or minus, evenly around the protractor scale. A variation larger than 1 degree or erratic or wandering flashes may be caused by a worn cam or distributor shaft or a bent distributor shaft.

#### Breaker Plate Wear

A worn breaker plate on the distributor will usually cause the breaker point gap and contact dwell to be erratic as engine speed and load conditions are varied.

Adjust the test set to 0 degree advance, 0 inches vacuum, and 1000 rpm. Adjust the dwell angle to 26 degrees. Apply vacuum to the distributor diaphragm and increase it very slowly while observing the indicated dwell angle. The maximum dwell angle variation should not exceed 4 degrees when going from zero to maximum vacuum at constant rpm. If the dwell angle variation exceeds this limit, there is excessive wear.

#### Distributor Spark Advance Test

The spark advance is checked to determine if the ignition timing advances in proper relation to engine speed and load.

1. Check the contact dwell. If the contact dwell is not within specifications, adjust the breaker points.
2. Check the breaker arm spring tension and adjust it or replace the points as necessary.

The dual advance distributor has two independently operated spark advance systems. Each system is adjusted separately. **Adjust the centrifugal advance before adjusting the vacuum advance.**

## ADJUSTMENTS (INDUSTRIAL ENGINES)

Accurate ignition system adjustments are of great importance in the proper operation and performance of the engine.

After any adjustment of ignition timing and distributor point dwell, check the distributor automatic advance for proper operation.

Carburetor fuel mixture and idle speed adjustments should be checked after making ignition system adjustments. The crankcase ventilation system and vacuum system must also be in good operating condition.

#### IGNITION TIMING

##### Timing Mark Locations

Each time the distributor points are replaced or adjusted, the ignition timing should be

checked and adjusted as necessary. Proper adjustment of the ignition timing must be maintained to provide maximum engine power output and best possible fuel economy.

The timing marks are their locations and are illustrated in Figure 7.

For checking and adjusting the ignition timing with a scope refer to the scope manufacturer's instructions. To check and adjust the timing with a timing light, proceed as follows:

#### Initial Ignition Timing

1. Clean and mark the specified timing mark with chalk or white paint.
2. Disconnect the vacuum line and plug the disconnected vacuum line.
3. Connect a timing light to the No. 1 cylinder spark plug wire. Connect a tachometer to the engine.
4. Start the engine and reduce the idle speed to 600 rpm to be sure that the centrifugal advance is not operating. Adjust the initial ignition timing to specifications by rotating the distributor in the proper direction.
5. Check the centrifugal advance for proper operation by starting the engine and accelerating it to approximately 2000 rpm. If the ignition timing advances, the centrifugal advance mechanism is functioning properly. Note the engine speed when the advance begins and the amount of total advance. Stop the engine.
6. Unplug the vacuum line and connect it to the distributor vacuum advance unit. Start the engine and accelerate it to approximately 2000 rpm. Note the engine speed when the advance begins and the total amount of advance.

Advance of the ignition timing should begin sooner and advance farther than when

checking the centrifugal advance alone. Stop the engine.

7. If the vacuum advance is not functioning properly, remove the distributor and check it on a distributor tester. Replace the diaphragm unit if the vacuum portion is out of calibration.

### DUAL-ADVANCE DISTRIBUTOR

**Adjust the centrifugal advance before adjusting the vacuum advance.**

#### Centrifugal Advance

1. Operate the distributor in the direction of rotation and adjust the speed to the initial rpm setting listed in the specifications. Move the protractor scale so that one of the flashes lines up with the zero degree mark.
2. Slowly increase the rpm to the setting specified for the first advance reading listed in the specifications.

If the correct advance is not indicated at this rpm, stop the distributor and bend one spring adjustment bracket to change its tension (Figure 8). Bend the adjustment bracket away from the distributor shaft to decrease advance (increase spring tension) and toward the shaft to increase advance (decrease spring tension). After the adjustment is made, identify the bracket so as not to repeat the adjustment on the same spring.

3. After an adjustment has been made to one spring, check the minimum advance point again.
4. Operate the distributor at the specified rpm to give an advance just below the maximum. If this advance is not to specifications, stop the distributor and bend the other spring bracket to obtain the correct advance.

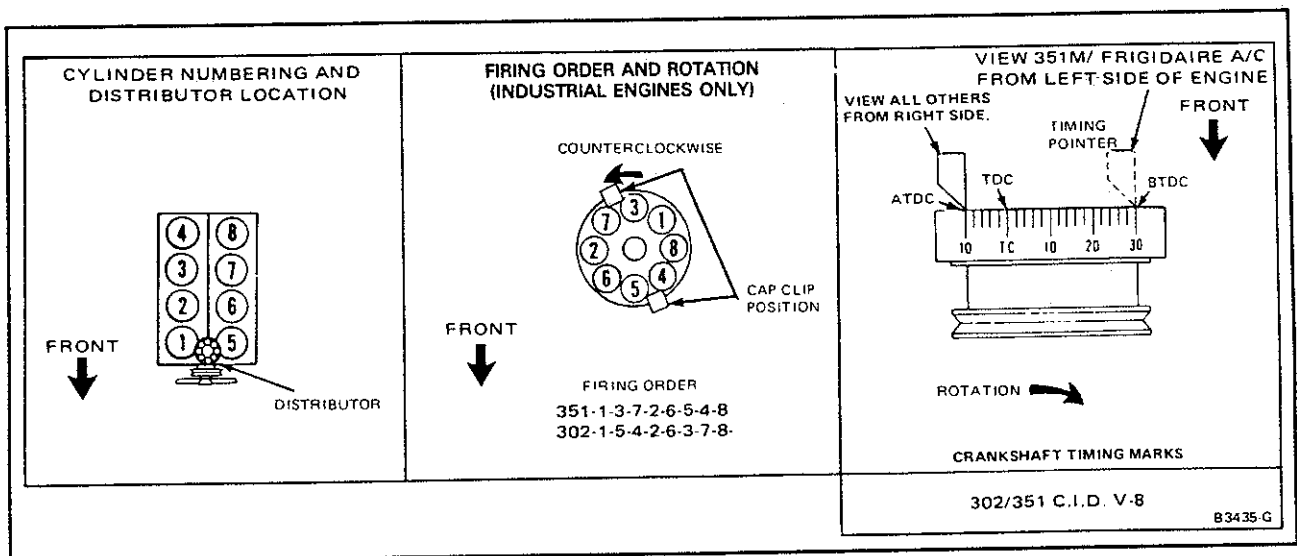


Figure 7 Engine Timing and Cylinder Firing Order — Typical

5. Check the advance at all rpm settings listed in the specifications. Operate the distributor both up and down the rpm range.

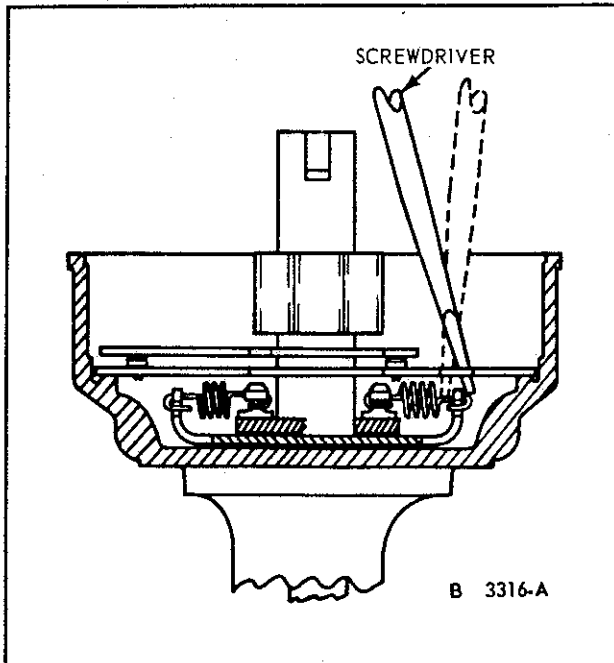


Figure 8 Centrifugal Advance Adjustment

#### Vacuum Advance

1. Connect the test set vacuum line to the fitting on the diaphragm.
2. Set the test set to 0 degree advance, 0 vacuum, and at 1000 rpm.
3. Check the advance at the first vacuum setting given in the specifications.

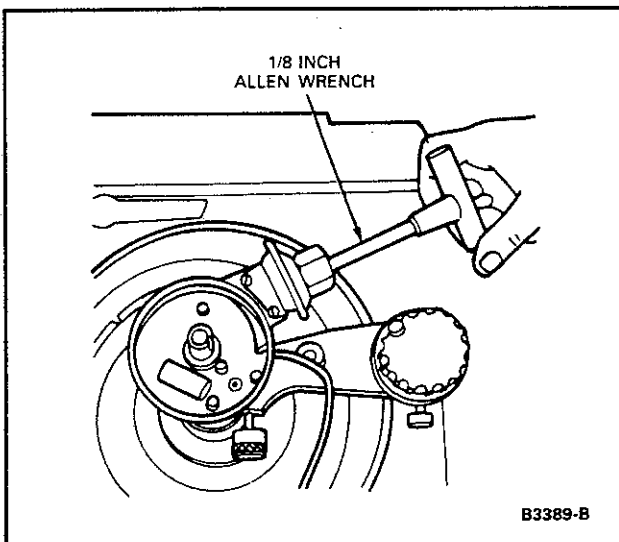


Figure 9 Vacuum Advance Adjustment

4. If the advance is incorrect and adjustment is required, disconnect the vacuum line and insert a 1/8 inch socket head wrench in the

end of the diaphragm (Figure 9). Turn the wrench clockwise to increase the vacuum advance or counterclockwise to decrease it.

Removal of a washer will increase advance.

5. After one vacuum setting has been adjusted, the others should be checked. Do not change the original rpm setting when going to a different vacuum setting. If the other settings are not within limits, there is incorrect spring tension, leakage in the vacuum chamber and/or line, or the wrong fiber stop has been installed in the vacuum chamber of the diaphragm housing.

To check the diaphragm for leakage:

Remove the vacuum line from the distributor. Adjust the vacuum pressure of a distributor tester to its maximum position. Hold your hand over the end of the tester's vacuum hose and note the maximum reading obtained. **Do not exceed 25 inches Hg.**

If the maximum reading is 25 inches Hg or less, connect the tester's vacuum line to the vacuum fitting on the diaphragm to be tested without changing any of the adjustments. The maximum gauge reading should not be less than it was above. If it is less, the diaphragm is leaking and should be replaced.

#### BREAKER POINTS AND/OR CONDENSER

##### Breaker Point Alignment

The breaker points must be accurately aligned and stroke squarely to assure normal breaker point life. Misalignment of these breaker point surfaces can cause premature wear, overheating and pitting.

1. Turn the cam so that the breaker points are closed, then check the alignment of the points (Figure 10).

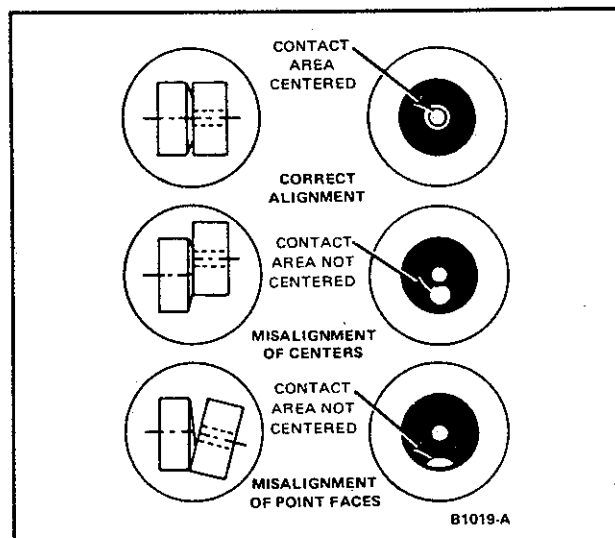


Figure 10 Checking Breaker Point Alignment



If the distributor is on the engine, close the points by proceeding as follows:

1. With the ignition switch off, crank the engine by using an auxiliary starter switch.
2. Using the tool shown (Figure 11) and exerting **very light pressure**, align the breaker point bracket. **Do not bend the breaker arm.**
3. After the breaker points have been properly aligned, adjust the breaker point gap.

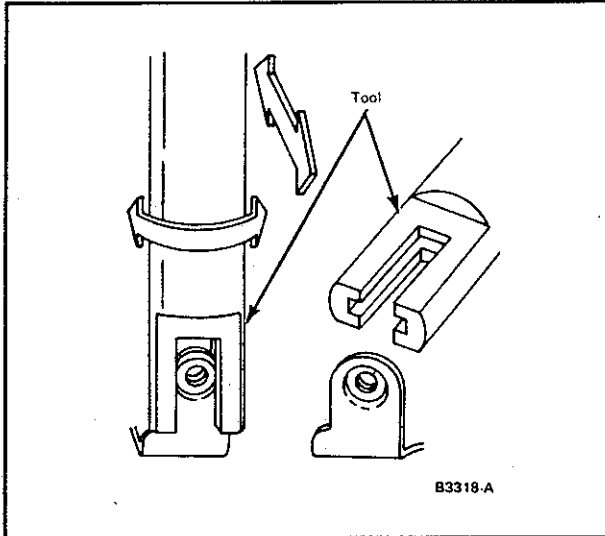


Figure 11 Using Alignment Tool

### Breaker Point Gap Adjustment

A scope, a dwell meter, or a feeler gauge can be used to check the gap of new breaker points.

A scope or a dwell meter should be used to check the gap of used breaker points. Due to the roughness of used points, it is not advisable to use a feeler gauge to check the gap.

To check and adjust the breaker points with a feeler gauge:

1. Check and adjust the breaker point alignment.
2. Rotate the distributor until the rubbing block rests on the peak of a cam lobe.

If a distributor is on the engine, place the rubbing block on the peak of the cam by proceeding as follows:

Crank the engine with an auxiliary starter switch.

Insert the correct thickness blade of a clean feeler gauge between the breaker points (Figure 12). Adjust the points to the correct gap and tighten the screws.

Clean the cam, then apply a light film of distributor cam lubricant (C4AZ-19D530-A) to the cam when new points are installed. **Do not use engine oil to lubricate the distributor cam.** Set the ignition timing.

Also, set the contact dwell to the low setting.

To check and adjust the breaker points with a scope or a dwell meter, refer to the manufacturer's instructions.

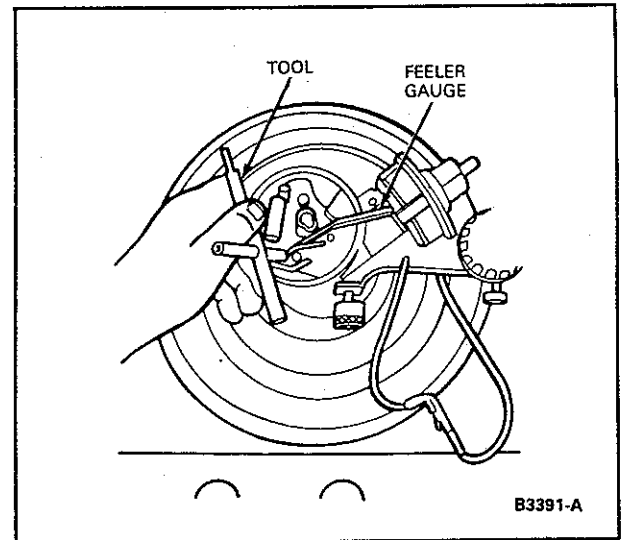


Figure 12 Adjusting New Breaker Point Gap

### Breaker Point Spring Tension Adjustment

Correct breaker point spring tension is essential to proper engine operation and normal breaker point life. If the spring tension is too great, rapid wear of the breaker arm rubbing block will result, causing the breaker point gap to close up and retard the spark timing. If the spring tension is too weak, the breaker arm will flutter at high engine rpm resulting in an engine miss.

To check the spring tension, place the hooked end of the spring tension gauge over the movable breaker point. Pull the gauge at a right angle (90 degrees) to the movable arm until the breaker points just start to open. A dwell meter can be used to determine exactly when the breaker points open. If the tension is not within specifications, adjust the spring tension.

1. Disconnect the primary lead wire and the condenser lead.
2. Loosen the nut holding the spring in position. **Move the spring toward the breaker arm pivot to decrease tension and in the opposite direction to increase tension.**
3. Tighten the locknut; then, recheck spring tension. Repeat the adjustment until the specified spring tension is obtained.
4. Connect the primary lead wire and the condenser lead.

To adjust the spring tension see Figure 13.

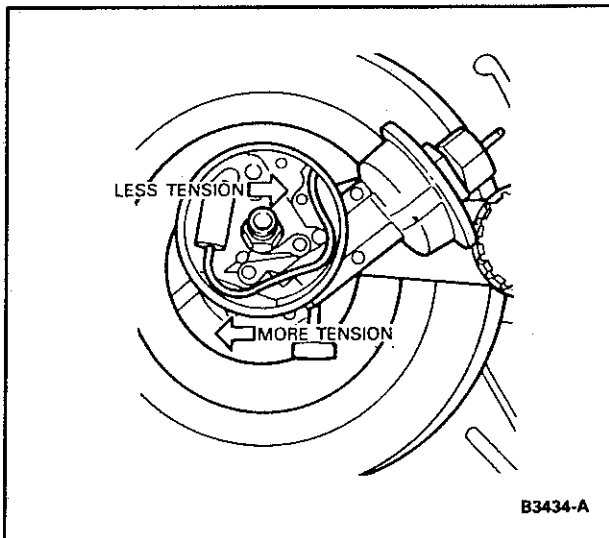


Figure 13 Adjusting Breaker Point Spring Tension

## REMOVAL AND INSTALLATION (INDUSTRIAL ENGINES) BREAKER POINTS AND/OR CONDENSER

### Removal

1. Remove the distributor cap and rotor.
2. Disconnect the primary and the condenser wires from the breaker point terminal.
3. Remove the breaker point assembly and condenser attaching screws. Lift the breaker point assembly and condenser out of the distributor.

### Installation

1. Clean the distributor cam thoroughly.
2. Apply a light film of distributor cam lubricant C4AZ-19D530-A on the cam. **Do not use any type of oil.**
3. Place the breaker point assembly and the condenser in position and install the attaching screws.
4. Align and adjust the breaker points.
5. Connect the primary and condenser wires to the breaker point terminal.
6. Install the rotor and the distributor cap.

## VACUUM ADVANCE UNIT

### Removal

1. Remove the distributor cap and rotor.
2. Disconnect the vacuum line.
3. Remove the spring clip that secures the diaphragm link to the movable breaker plate.
4. Remove the diaphragm unit attaching screws, and carefully remove the unit.

### Installation

1. Position the diaphragm unit on the distributor and hook the diaphragm link in position.

2. Install the spring clip that secures the diaphragm link to the movable breaker plate. Install the diaphragm unit attaching screws.
3. Connect the vacuum line.
4. Install the rotor and the distributor cap.

## SPARK PLUG WIRE

When removing the wires from the spark plugs, grasp, twist and pull the moulded cap by hand only. Do not pull on the wire because the wire connection inside the cap may become separated or the boot may be damaged.

### Removal

1. Disconnect the wires from the spark plugs and distributor cap.
2. Lift the wires from the clip on the valve rocker arm cover and remove the wires.
3. Remove the coil high tension lead.

### Installation

1. Insert each wire in the proper socket of the distributor cap. Be sure the wires are forced all the way down into their sockets. Cylinders are numbered from front to rear; right bank 1-2-3-4, left bank 5-6-7-8.
2. Remove the wire retaining bracket from the old spark plug wire set and install it on the new set in the same relative position. Install the wires in the brackets on the valve rocker arm covers. Connect the wires to the proper spark plugs. Install the coil high tension lead.
3. Install the wires in a counterclockwise direction in the firing order (1-5-4-2-6-3-7-8) starting in the No. 1 socket. Note that the wires are positioned in this bracket in a special order from front to rear (7-5-6-8).

## SPARK PLUGS

### Removal

1. Disconnect the wire from each spark plug by grasping, twisting and then pulling the moulded cap of the wire only. **Do not pull on the wire because the wire connection inside the cap may become separated or the weatherseal may be damaged.**
2. After loosening each spark plug one or two turns, clean the area around each spark plug port with compressed air, then remove the spark plugs.

### Installation

**After cleaning, the electrodes must be dressed with a small file to obtain flat parallel surfaces on both the center and side electrodes (Figure 14). Set the spark plug gap to specifications by bending the ground electrode (Figure 15); all spark plugs, new or used, should have the gap checked and reset as required.**

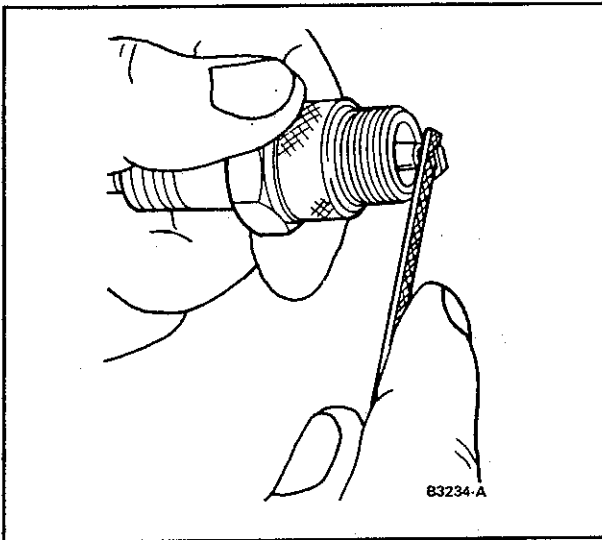


Figure 14 Filing Spark Plug Electrode

## DISTRIBUTOR

### Removal

1. Remove the air cleaner. Disconnect the primary wire from the coil.

Disconnect the vacuum advance line(s) at the distributor. Remove the distributor cap.

2. Scribe a mark on the distributor body and the cylinder block indicating the position of the body in the block, and scribe another mark on the distributor body indicating the position of the rotor. These marks can be used as guides when installing the distributor in a correctly timed engine.
3. Remove the distributor hold down bolt and clamp. Lift the distributor out of the block.

**Do not rotate the crankshaft while the distributor is removed, or it will be necessary to time the engine.**

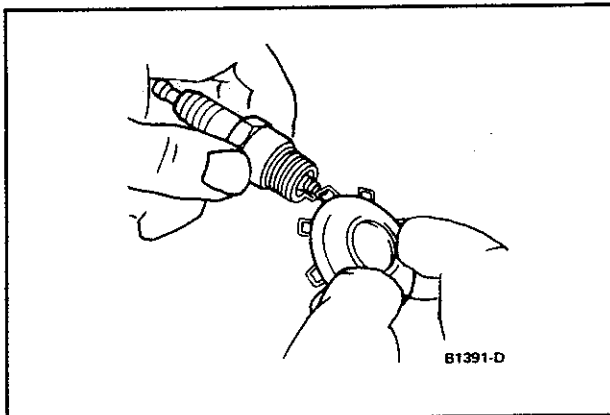


Figure 15 Checking and Setting Spark Plug Gap

### Installation

1. If the crankshaft was rotated while the distributor was removed from the engine, it will be necessary to time the engine. Rotate the crankshaft until No. 1 piston is on TDC after the compression stroke. Align the TDC mark on the timing pointer with the timing pin on the crankshaft damper. Position the distributor in the block with the rotor at the No. 1 firing position.

**Make sure the oil pump intermediate shaft properly engages the distributor shaft. It may be necessary to crank the engine with the starter, after the distributor drive gear is partially engaged to engage the oil pump intermediate shaft.**

**Install, but do not tighten, the retaining clamp and bolt. Rotate the distributor to advance the timing to a point where the breaker points are just starting to open. Tighten the clamp.**

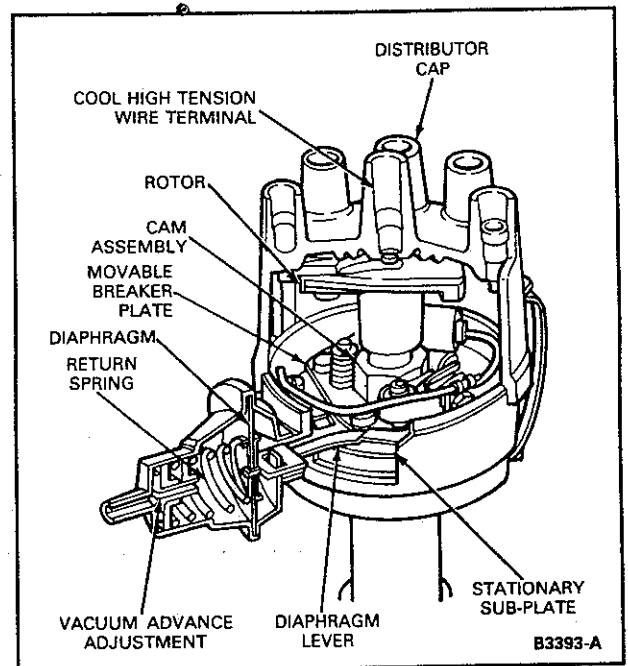


Figure 16 Breaker Plate Installed

2. If the crankshaft has not been moved, position the distributor in the block with the rotor aligned with the mark previously scribed on the distributor body and the marks on the distributor body and cylinder block in alignment.
3. Install the distributor cap.
4. Connect the primary wire to the coil.
5. Check the ignition timing with a timing light and adjust to specifications. Connect the vacuum line, and check the advance with the timing light when the engine is accelerated.
6. Install the air cleaner.

### BREAKER PLATE AND SUB-PLATE

Refer to Figure 16 for the correct location of parts.

**Removal**

1. Remove the distributor cap and rotor.
2. Remove the breaker point assembly and the condenser. Remove the vacuum diaphragm.
3. Working from the inside of the distributor, pull the primary wire through the opening out of the distributor.
4. Remove the sub-plate attaching screws and lift the assembly from the distributor.

**Installation**

1. Place the breaker plate assembly in position in the distributor.
2. Install the sub-plate hold down screws (the ground wire should be under the sub-plate hold down screw from which it was removed).
3. Insert the primary wire in the distributor. Install the breaker points and the condenser. Connect the primary wire and the condenser wire to the breaker point terminal. Install the vacuum diaphragm.
4. Install the rotor and the distributor cap.

**CLEANING AND INSPECTION****SPARK PLUGS**

Examine the firing of the spark plugs, noting the type of deposits and the degree of electrode erosion. Refer to Figure 17 for the various types of spark plug fouling and their causes.

Clean the plugs on a sand blast cleaner, following the manufacturer's instructions. **Do not prolong the use of the abrasive blast as it will erode the insulator and electrode.**

Examine the plug carefully for cracked or broken insulators, badly pitted electrodes, and other signs of failure. Replace as required.

**DISTRIBUTOR**

Soak all parts of the distributor assembly (except the condenser, breaker point assembly, lubricating wick, vacuum diaphragm, distributor base oil seal and electrical wiring) in a mild cleaning solvent or mineral spirits. Do not use a harsh cleaning solution. Wipe all parts that cannot be immersed in a solvent with a clean dry cloth.

After foreign deposits have been loosened by soaking, scrub the parts with a soft bristle brush. **Do not use a wire brush, file, or other abrasive object.** Dry the parts with compressed air.

Inspect the distributor cam lobes for scoring and signs of wear. If any lobe is scored or worn, replace the distributor.

Inspect the breaker plate assembly for signs of distortion, wear or damage. Replace the breaker plate assembly if it is damaged.

Inspect all electrical wiring for fraying, breaks, etc. and replace any that is not in good condition.

Check the distributor base for cracks or other damage.

Check the diaphragm housing, bracket, and rod for damage. Check the vacuum line for damage. Test the diaphragm for leakage as explained under Distributor Test. Replace all defective parts.

The breaker point assembly consists of the stationary point bracket assembly, breaker arm and the primary wire terminal.

Breaker points should be inspected, cleaned and adjusted as necessary. Breaker points can be cleaned with chloroform and a stiff bristle brush. Replace the breaker point assembly if the contacts are badly burned or excessive metal transfer between the points is evident (Figure 18). Metal transfer is considered excessive when it equals or exceeds the gap setting specifications.

**Distributor Cap**

Clean the distributor cap with a soft bristle brush and mild cleaning solvent or mineral spirits. Dry the cap with compressed air. Inspect the cap for cracks, burned contacts, broken carbon button, carbon tracks or dirt or corrosion in the sockets. Replace the cap if it is damaged.

**Rotor**

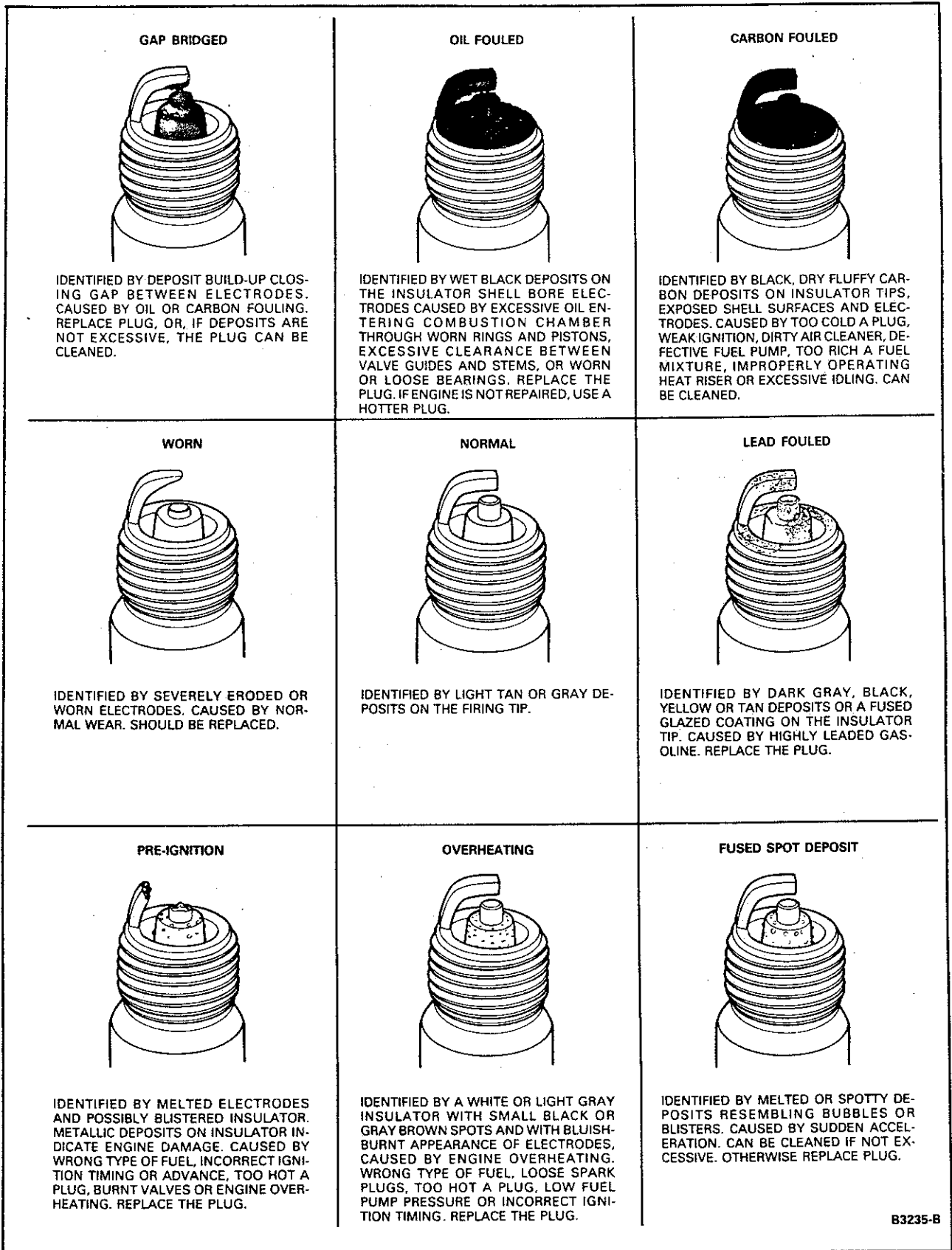
Clean the rotor with a soft bristle brush and mild cleaning solvent or mineral spirits. Dry the rotor with compressed air. Inspect the rotor for being broken, cracked, having carbon tracks, or burning. Replace the rotor if it is corroded or damaged.

**Secondary Wiring**

Wipe the wires with a damp cloth and check for breaks or cracked insulation. Inspect the terminals and boots for looseness or corrosion. Replace any wires that are not in good condition.

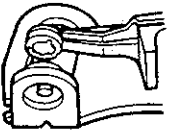
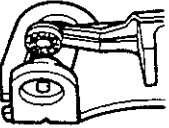
**Coil**

Wipe the coil with a damp cloth and check for any cracks or other defects.



B3235-B

Figure 17 Spark Plug Inspection

CONDITION	CAUSED BY
 BURNED	INCORRECT VOLTAGE REGULATOR SETTING. RADIO CONDENSER INSTALLED TO THE DISTRIBUTOR SIDE OF THE COIL.
 EXCESSIVE METAL TRANSFER OR PITTING	INCORRECT ALIGNMENT. INCORRECT VOLTAGE REGULATOR SETTING. RADIO CONDENSER INSTALLED TO THE DISTRIBUTOR SIDE OF THE COIL. IGNITION CONDENSER OF IMPROPER CAPACITY. EXTENDED OPERATION OF THE ENGINE AT SPEEDS OTHER THAN NORMAL.

B1443-C

Figure 18 Breaker Point Inspection

## PRESTOLITE DISTRIBUTORS (MARINE ENGINES) — BREAKER TYPE

### DESCRIPTION AND OPERATION

The centrifugal advance distributor is a straight mechanical-type unit. A governor-type centrifugal advance is located below the stationary breaker plate (Figure 19). Two centrifugal weights cause the cam to advance or move ahead with respect to the distributor drive shaft, the rate of advance is controlled by two calibrated springs.

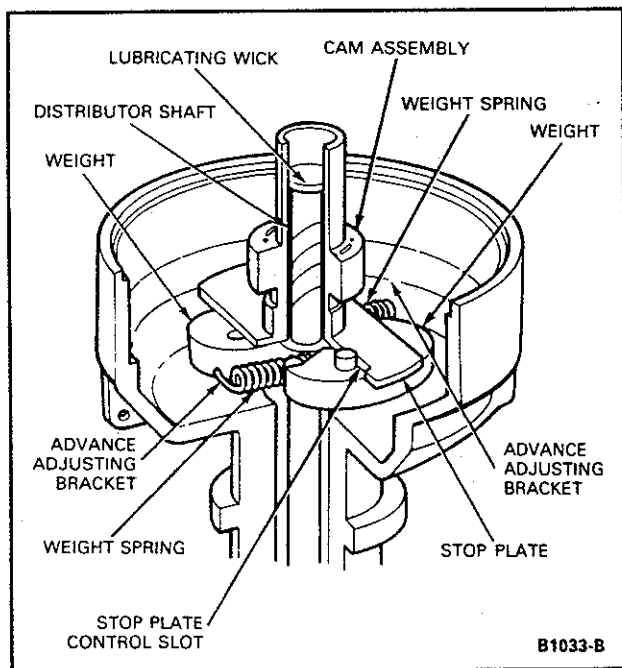


Figure 19 Centrifugal Advance Mechanism

## ADJUSTMENTS AND REPAIRS BREAKER POINTS AND/OR CONDENSER

### Removal

1. Remove the distributor cap and the rotor. **Be sure to remove the distributor cap retaining screws before removing the cap.**
2. Disconnect the primary and the condenser wires from the breaker point assembly.
3. Remove the breaker point assembly and condenser retaining screws. Lift the breaker point assembly and condenser out of the distributor.

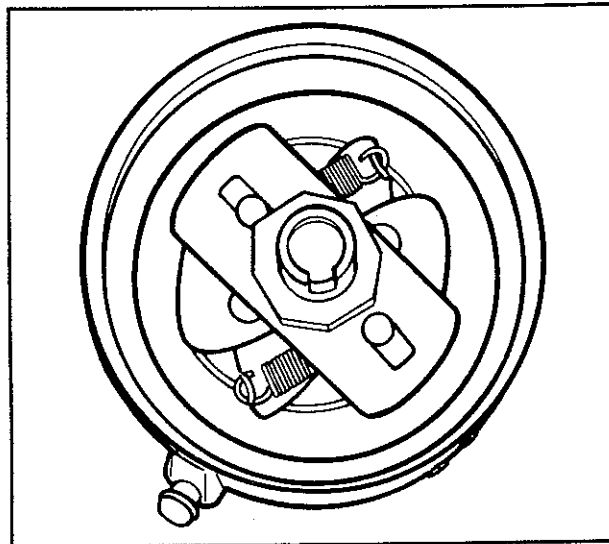


Figure 20 Weights, Springs, and Cam Installed

### Installation

1. Place the breaker point assembly and the condenser in position and install the retaining screws.
2. Align and adjust the breaker point assembly.
3. Connect the primary and condenser wires to the breaker point assembly.
4. Install the rotor and the distributor cap.

## BREAKER PLATE AND SUB-PLATE

### Removal

1. Remove the distributor cap and rotor.
2. Working from the inside of the distributor, pull the primary wire through the opening out of the distributor.
3. Remove the sub-plate attaching screws and lift the assembly from the distributor.

### Installation

1. Place the breaker plate assembly in position in the distributor.
2. Install the sub-plate hold down screws.

3. Insert the primary wire in the distributor. Install the breaker points and the condenser. Connect the primary wire and the condenser wire to the breaker point terminal.
4. Install the rotor and the distributor cap.

## CAM AND CENTRIFUGAL ADVANCE WEIGHTS

### Removal

1. Remove the breaker plate and sub-plate from the distributor.
2. **Mark one of the distributor weight springs and its brackets. Also mark one of the weights and its pivot pin.**
3. Carefully unhook and remove the weight springs.
4. Lift the lubricating wick from the cam assembly. Remove the cam assembly retainer and lift the cam assembly off the distributor shaft. Remove the thrust washer.
5. Lift the weights out of the distributor.

### Installation

1. If the weights were removed, fill the grooves in the weight pivot pins with distributor cam lubricant (C4AZ-19D530-A).

Position the weights in the distributor (**the marked weight is placed on the marked pivot pin**) and install the weight retainers.

2. Place the thrust washer on the shaft.
3. Fill the grooves in the upper portion of the distributor shaft with distributor cam lubricant (C4AZ-19D530-A).
4. Install the cam assembly. **Be sure that the marked spring bracket on the cam assembly is near the marked spring bracket on the stop plate.**

**Place a light film of distributor cam lubricant (C4AZ-19D530-A) on the distributor cam lobes. Install the retainer and the wick. Oil the wick with SAE-10W engine oil.**

5. Install the weight springs. **Be sure that the marked spring is attached to the marked spring brackets.**
6. Install the plate assembly.
7. Install the primary wire in the distributor. Connect the primary and condenser wires to the breaker point terminal.
8. Adjust the breaker point gap or dwell as required.

## DISTRIBUTOR

### Removal

1. Remove the air cleaner. Disconnect the primary wire from the coil. Remove the distributor cap.

2. Scribe a mark on the distributor body and the cylinder block indicating the position of the body in the block, and scribe another mark on the distributor body indicating the position of the rotor. These marks can be used as guides when installing the distributor in a correctly timed engine.
3. Remove the distributor hold down bolt and clamp. Lift the distributor out of the block.

**Do not rotate the crankshaft while the distributor is removed, or it will be necessary to time the engine.**

### Installation

1. If the crankshaft was rotated while the distributor was removed from the engine, it will be necessary to time the engine. Rotate the crankshaft until No. 1 piston is on TDC after the compression stroke. Align the TDC mark on the timing pointer with the timing pin on the crankshaft damper. Position the distributor in the block with the rotor at the No. 1 firing position.

**Make sure the oil pump intermediate shaft properly engages the distributor shaft. It may be necessary to crank the engine with the starter, after the distributor drive gear is partially engaged to engage the oil pump intermediate shaft.**

**Install, but do not tighten, the retaining clamp and bolt. Rotate the distributor to advance the timing to a point where the breaker points are just starting to open. Tighten the clamp.**

2. If the crankshaft has not been moved, position the distributor in the block with the rotor aligned with the mark previously scribed on the distributor body and the marks on the distributor body and cylinder block in alignment.
3. Install the distributor cap.
4. Connect the primary wire to the coil.
5. Check the ignition timing with a timing light and adjust to specifications.
6. Install the air cleaner.

## MAJOR REPAIR OPERATIONS

To perform the operations in this section, it will be necessary to remove the distributor from the engine and place it in a vise.

### BENCH DISASSEMBLY

Refer to Figure 21 for the location of parts.

#### Conventional Ignition System Distributor

1. Remove the rotor.
2. Disconnect the primary wire, the jumper strap, and the condenser wire from the breaker point assemblies.

3. Remove the retaining screws from the breaker point assemblies and condenser. Lift the breaker point assembly and the condenser out of the distributor.
4. Working from the inside of the distributor, pull the primary wire through the opening in the distributor.
5. Remove the breaker point and condenser plate retaining screws and lift the plate out of the distributor.
6. **Mark one of the distributor weight springs and its brackets. Also mark one of the weights and its pivot pin.**
7. **Carefully unhook and remove the weight springs.**
8. **Lift the lubricating wick from the cam assembly. Remove the cam assembly retainer and lift the cam assembly off the distributor shift. Remove the thrust washer.**
9. **Lift the weights out of the distributor.**
10. **If the gear and shaft are to be used again, mark the gear and the shaft so that the pin holes can be easily aligned for assembly. Remove the gear roll pin and then remove the gear.**
11. Remove the shaft collar roll pin.
12. Invert the distributor and place it on a support in a position that will allow the distributor shaft to clear the support plate and press the shaft out of the collar and the distributor housing.
13. Remove the distributor shaft upper bushing.
14. Remove the distributor shaft lower bushing.
9. Position the distributor in a vise. Fill the grooves in the weight pivot pins with distributor cam lubricant (C4AZ-19D530-A).
10. Position the weights in the distributor (**the marked weight is placed on the marked pivot pin**) and install the weight retainers.
11. Place the thrust washer on the shaft.
12. Fill the grooves in the upper portion of the distributor shaft with distributor cam lubricant (C4AZ-19D530-A).
13. Install the cam assembly. **Be sure that the marked spring bracket on the cam assembly is near the marked spring bracket on the stop plate.**  
Place a light film of distributor cam lubricant (C4AZ-19D530-A) on the distributor cam lobes. Install the retainer and the wick. Saturate the wick with SAE 10W engine oil.
14. Install the weight springs. **Be sure that the marked spring is attached to the marked spring brackets.**
15. Place the breaker point and condenser plate in position and install the retaining screws.
16. Working from the inside of the distributor, push the primary wire through the opening in the distributor housing.
17. Place the breaker point assembly and the condenser in position and install the retaining screws.
18. Align and adjust the breaker point assembly.
19. Connect the primary wire and the condenser wire to the breaker point assembly.
20. Install the rotor and the distributor cap.
21. Check and adjust (if necessary) the centrifugal advance mechanism.

## BENCH ASSEMBLY

### Original Shaft and Gear

1. Oil the new upper bushing, and install it on the bushing replacer tool. Then install the upper bushing. When the tool bottoms against the distributor base, the bushing will be installed to the correct depth.
2. Burnish the bushing to the proper size.
3. Invert the distributor and install the lower bushing in a similar manner.
4. Oil the shaft and slide it into the distributor body.
5. Place the collar in position on the shaft and align the holes in the collar and shaft, then install a new pin.
6. Check the shaft end play with a feeler gauge placed between the collar and the base of the distributor. If the end play is not within limits, replace the shaft and gear.
7. Press the gear on the shaft, using the marks made on the gear and shaft as guides to align the pin holes.
8. Remove the distributor from the press. Install the gear retaining pin.

### NEW SHAFT AND GEAR

The shaft and gear are replaced as an assembly. One part should not be replaced without replacing the other.

1. Follow steps 1, 2, 3 and 4 under "Installing Original Shaft and Gear Conventional Ignition System Distributor".
2. Insert a .024-inch feeler gauge between the collar and distributor base. Slide the collar on the shaft. While holding the collar in place against the distributor base, drill a 1/8-inch hole through the shaft using the hole in the collar as a pilot. Remove the feeler gauge.
3. Position the gear on the end of the shaft. Install the assembly in a press.
4. With the backing screw on the support tool tightened enough to remove all end play, press the gear on the shaft to the specified distance from the bottom face of the gear to the bottom face of the distributor mounting flange (Figure 15). Drill a 1/8-inch hole through the shaft using the hole in the gear as a pilot.



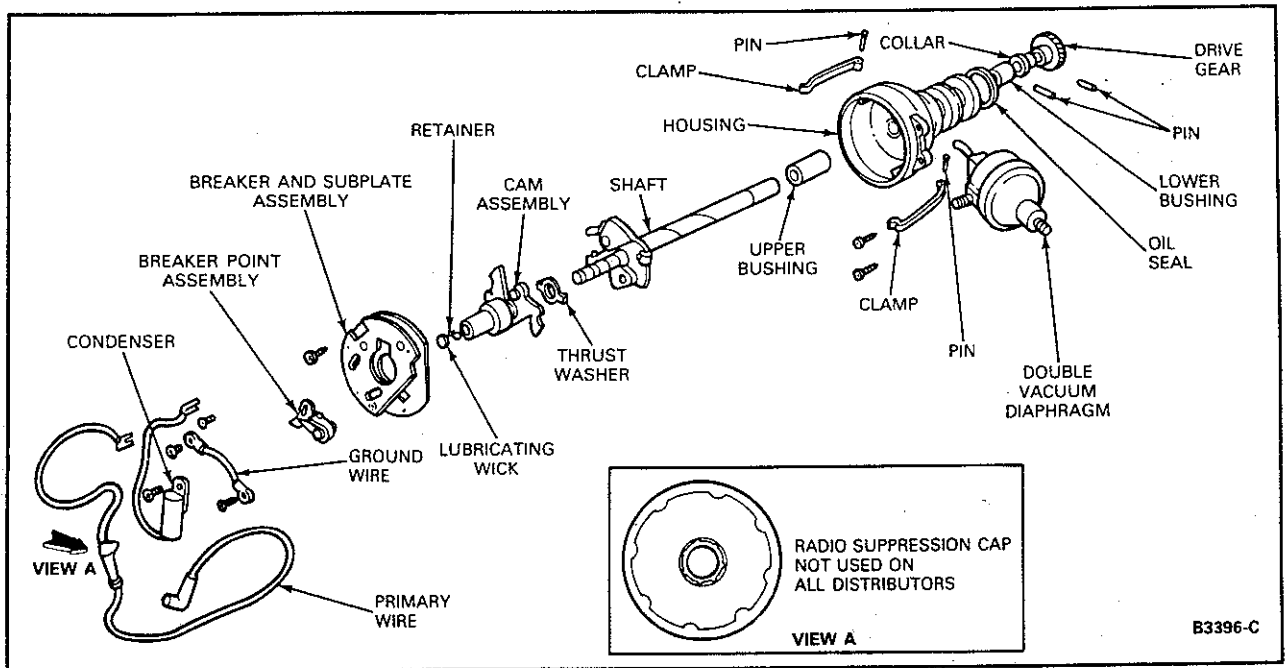


Figure 21 Distributor Assembly (Conventional)

5. Remove the distributor from the press. Install the collar retaining pin (Figure 7) and the gear retaining pin (Figure 5).
6. On a conventional ignition system distributor, complete the assembly by following steps 10 through 21 under Original Shaft and Gear Bench Assembly.

### PRESTOLITE ELECTRONIC BREAKERLESS DISTRIBUTORS

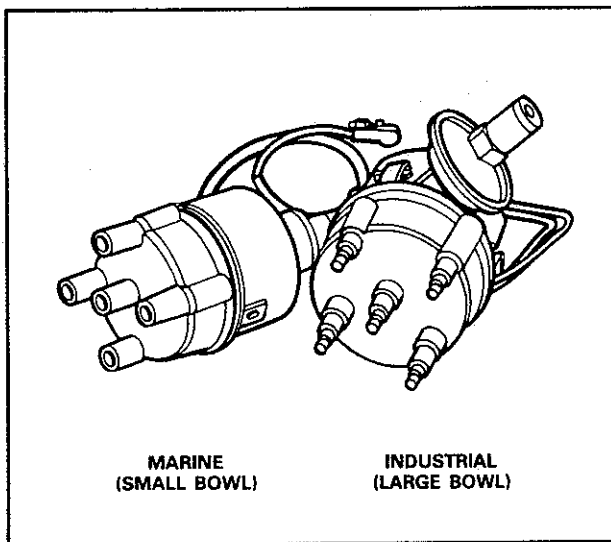


Figure 22 Electronic Ignition for Industrial Engines

The Prestolite electronic distributor of BID (Breakerless Inductive Discharge) is an electronic switching device for controlling the current in the primary of a high voltage coil and the collapse of the coil secondary magnetic field. The distributor

is conventional type with mechanical advance, except the base plate, which includes the contact points and condenser, is replaced with an electronic module that has a proximity sensor. Also, the cam is replaced by a trigger wheel.

The BID module is activated when the ignition switch is placed in "start" or "run" position. An oscillator within the module supplies the sensor with an alternating current signal which creates a metal sensitive electromagnetic field. When a leading edge of a trigger wheel tooth (presence of metal) enters the electromagnetic field, the sensor's oscillation strength is reduced to a predetermined level, in turn activating a demodulator circuit. The demodulator circuit controls a power transistor located in series with the primary circuit. The power transistor switches the coil primary circuit off, thereby, inducing a high voltage in coil secondary and consequent spark at spark plugs.

When the trigger wheel tooth is away from the sensor (absence of metal) the oscillator is at a high level. This causes the transistor to turn on and current to flow in the coil primary winding.

The dwell is determined by the gap between sensor to trigger wheel, a resistor value in the electronic module and the geometric design of trigger wheel.

Prestolite BID distributors have the following features:

- Self contained solid state module.
- Current regulation to approximately 4.5 amps which eliminates need for ballast resistor or resistance primary wire.
- Moisture resistant module.

- Not speed sensitive (will operate any speed above "0" RPM including speeds above limits of breaker point type).
- Reverse polarity protection.
- Transient voltage protection.
- Shock and vibration resistant.
- BID ignition maintains a tuned condition longer since there are no points to deteriorate and shaft & bushing wear is reduced.
- Will operate with standard coil, however, a special coil with low primary resistance is recommended for optimum performance.
- BID produces higher voltages and faster voltage rise time than contact system. This reduces emissions and enables ignition system to successfully fire less than optimum condition plug wires and plugs.

A sensor and trigger wheel device replaces the points and condenser in the distributor and controls the precise timing needed to fire the spark plugs. The Prestolite integral electronic ignition system is available in two styles — a large bowl, 3-5/8" diameter and a small bowl, 3-3/8" diameter. The electronic ignition unit controls timing and dwell by accurately making and breaking the ignition coil primary circuit. (Figure 23)

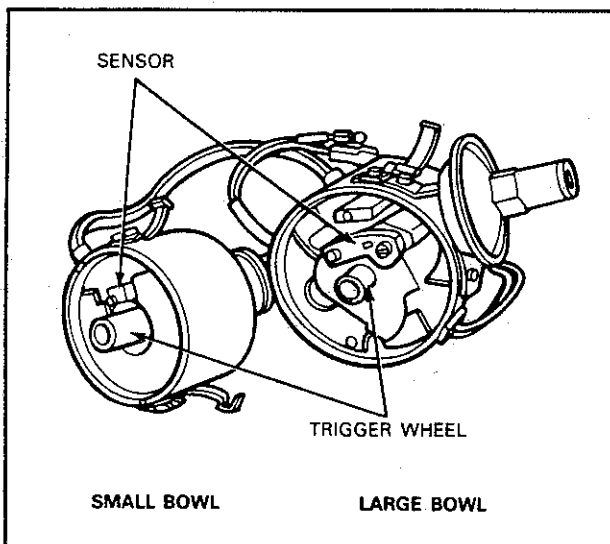


Figure 23 Electronic Ignition Unit

The breaker type uses a mechanical switch to make and break the ignition coil primary circuit "breaker points and condenser". Electronic systems accomplish this same duty by means of an electrical switch, "a transistor". (Figure 24)

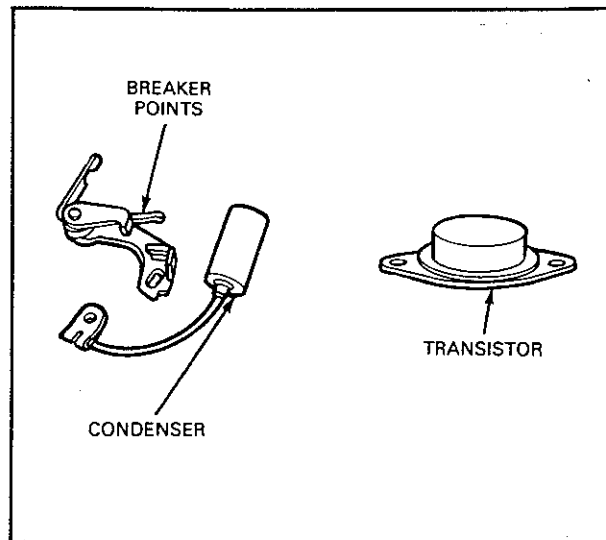


Figure 24 Breaker Type

The Prestolite electronic ignition system is "integrated". The electronics are housed inside the distributor. Only 2 connections are made to the coil. The electronic control unit contained in the distributor is connected to the battery via the coil positive terminal and grounded through the distributor base. (Figure 25)

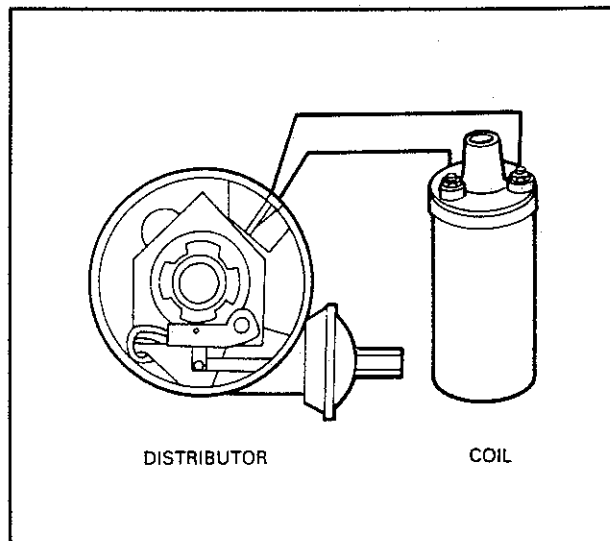


Figure 25 Ignition System — Integrated

The Prestolite design is known as a "tuned" system. It uses an oscillator as its sensor. Acting as a "metal detector", it senses the trigger wheel teeth turning with the distributor shaft. The presence of metal (each tooth) causes a change to occur in the oscillator which in turn commands the control unit transistor switch to turn off. (Figure 26)

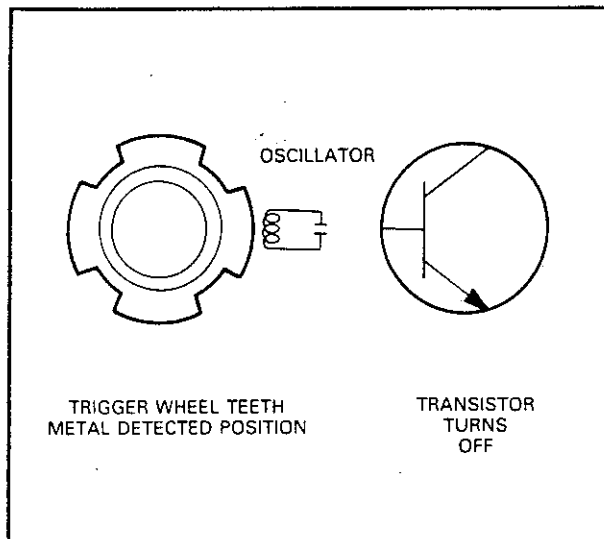


Figure 26 Prestolite Design

This off condition causes the primary current to stop flowing and the magnetic field which built up during the on time now will collapse across the secondary coil winding causing the high voltage to fire the spark plug. (Figure 27)

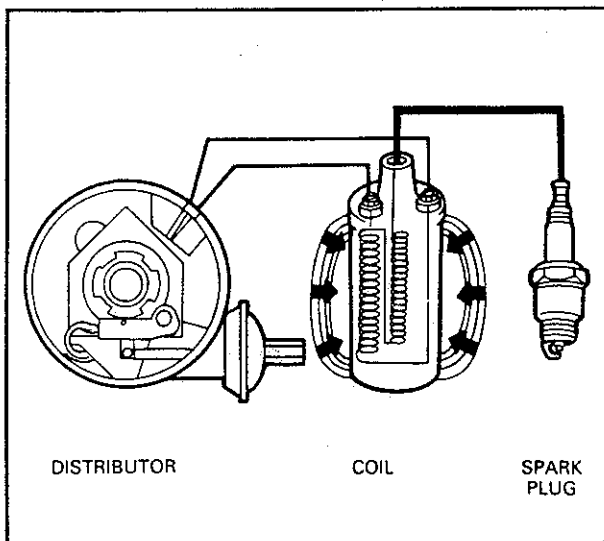


Figure 27 Off Condition Flow Chart

The sensor is a coil of **very fine wire molded into a plastic housing**. This plastic housing is mounted on the movable base plate and connected directly to the circuit board. The sensor is not replaceable. (Figure 28)

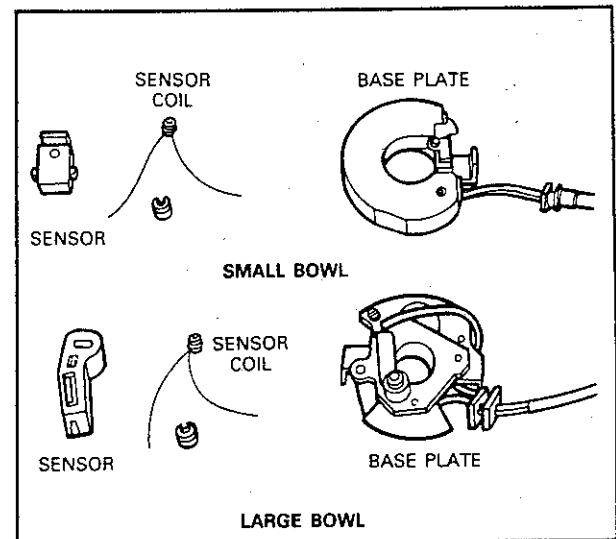


Figure 28 Sensor

The electronic control system is a completely self-contained solid state device which is coated to provide a moisture proof barrier. It is not repairable and if necessary must be replaced as a complete assembly. (Figure 29)

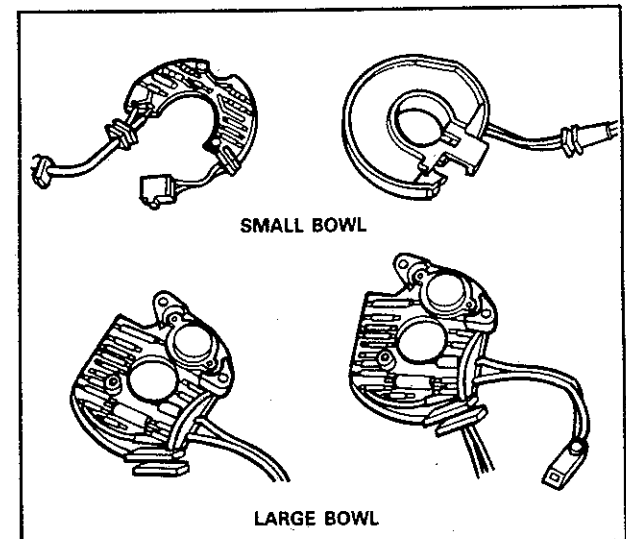


Figure 29 Electronic Solid State Systems

The distributor is of conventional design incorporating conventional advance mechanisms. Some applications use only mechanical advance while others use both mechanical and vacuum advance. (Figure 30)

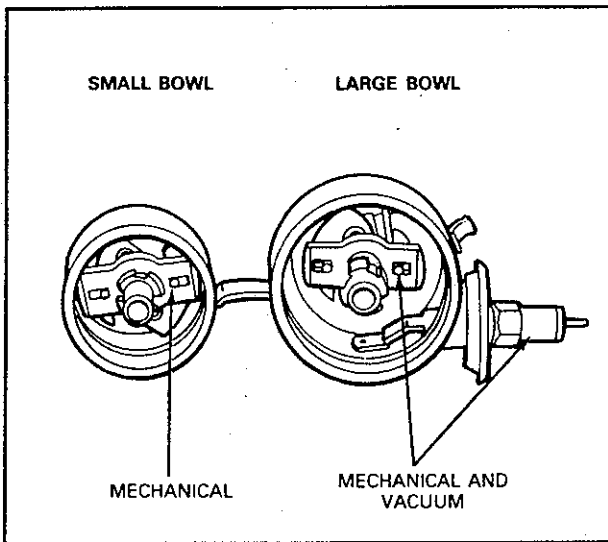


Figure 30 Distributor

The distributor cap is designed to give excellent dielectric strength and crack resistance. The marine caps are retained to the distributor body by two methods reference (Figure 31).

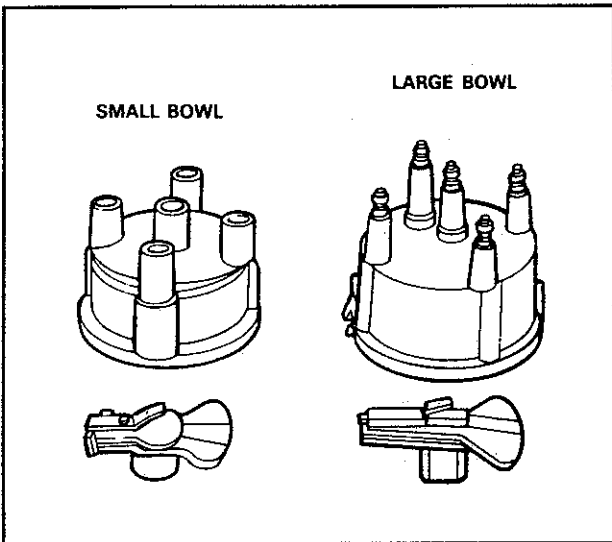


Figure 31 Distributor Cap

The ignition coil is of a special design for use with this system. A low resistance primary winding achieves high output for starting. A ballast resistor is not used, as primary current is regulated in the electronics. (Figure 32)

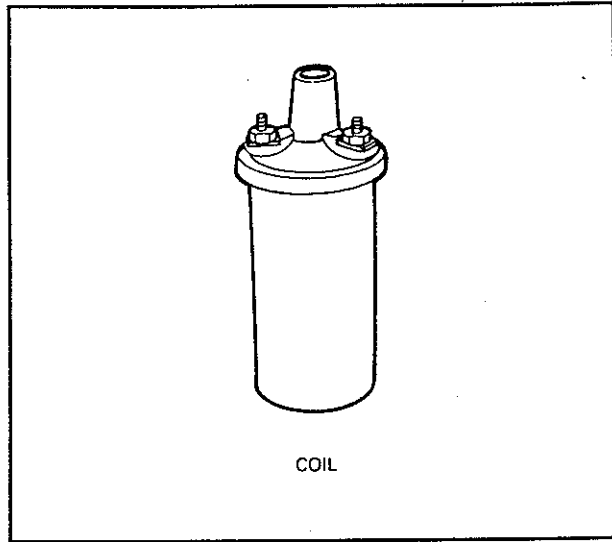


Figure 32 Ignition Coil

As mentioned before, this system operates as a metal detecting system. The detected metal is each tooth of the trigger wheel when it is in close proximity to the sensor coil. The system is not speed sensitive, that is, it is not necessary to "generate" an electrical current by turning the distributor shaft, and will operate at any speed above zero rpm. (Figure 33)

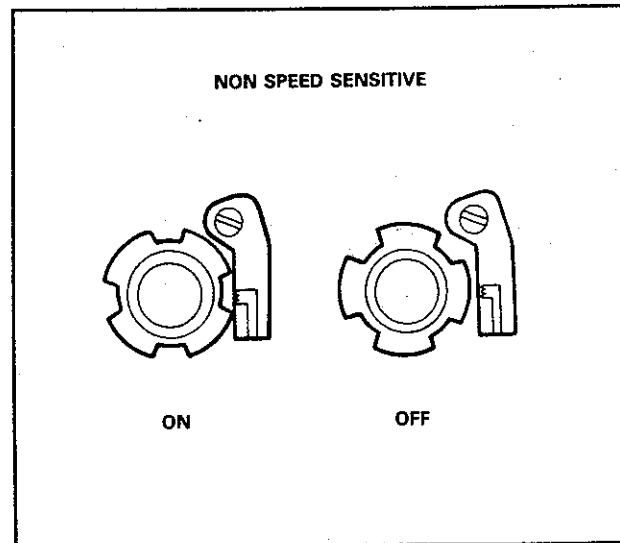


Figure 33 Switch Positions

When a tooth of the trigger wheel is near the sensor, metal is detected, the oscillator is at a low level, the transistor is off, no primary current flows. This condition can be compared to "points open". (Figure 34)

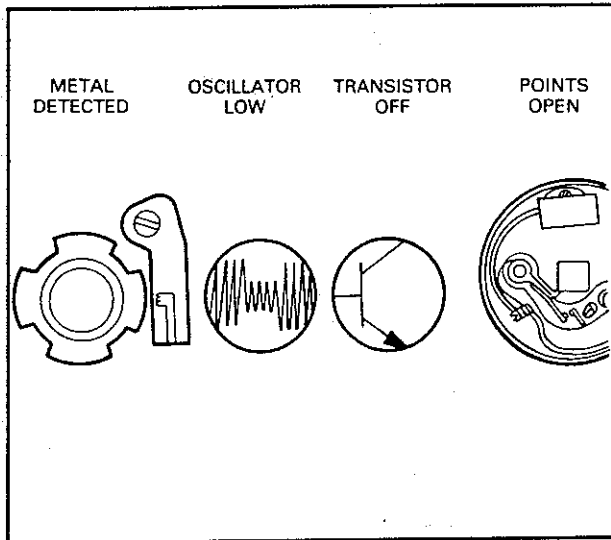


Figure 34 Trigger Wheel Near Sensor Metal

When the trigger wheel is away from the sensor, metal is not detected, the oscillator is at a high level, the transistor is on, current flows in the primary winding. This condition can be compared to "points closed". (Figure 35)

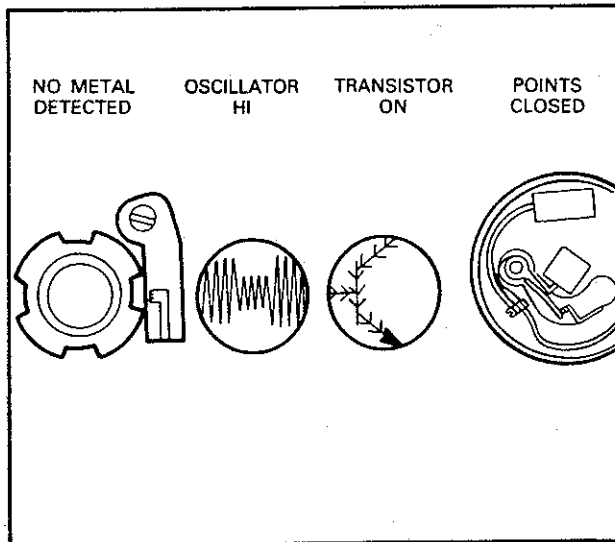


Figure 35 Trigger Wheel Away From Sensor

**TROUBLESHOOTING**

The primary section is the low voltage section and is composed of the battery, the ignition switch, the ignition coil primary winding, distributor electronics and associated wiring. (Figure 36)

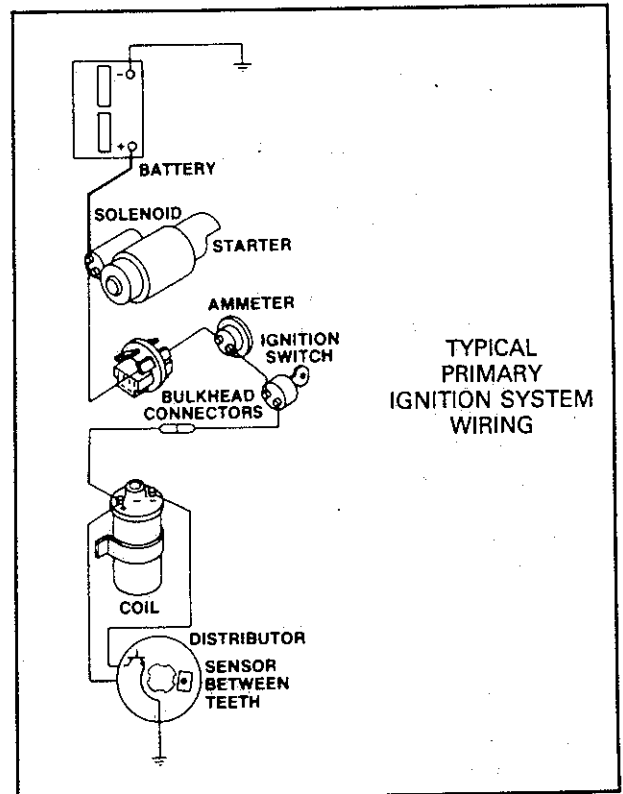


Figure 36 Primary Section — Low Voltage

The secondary section is the high voltage section and is composed of the ignition coil secondary winding, the distributor cap, the rotor, the spark plug cables and the spark plugs. (Figure 37)

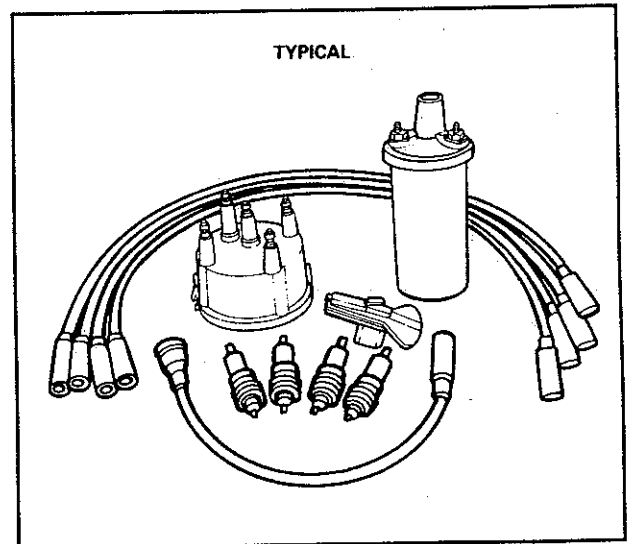


Figure 37 Secondary Section — High Voltage

If a problem develops in this system, it is an easy matter to troubleshoot.

### SECONDARY SYSTEM CHECKS

First visually check the secondary system.

Check the coil tower for cracking. Check primary wires for tight connections and proper polarity. Make sure the tower is clean and dry. Check coil nipple for proper sealing and insulating qualities. If flashover occurs here, the engine probably won't start.

**Check the distributor cap for cracking and dirt inside and outside. Moisture and dirt make a good path for flashover. It is very important that the cap be cleaned. Once a crack has started, the cap must be replaced.**

Check the coil to cap cable for proper resistance and excessive foldover of the conductor where it enters the coil tower; check the fit of the nipple on the coil tower. A high voltage leak at this point will cause a no start condition. Remember an engine may run with poor insulation but will refuse to start especially in damp or wet weather.

Check spark plug cables for burning, cracks and deterioration; check for torn or cracked spark plug and distributor cap boots. Test all cables for proper resistance with an ohmmeter. Refer to the appropriate service manual for system specifications.

Check spark plugs for fouling, check for cracked insulators. Wipe insulators clean before installing boots.

The use of a dielectric grease at high voltage connecting points such as coil and cap towers and spark plugs is recommended as an acceptable practice.

If the engine cranks but will not start, remove the center cable from the distributor cap and install an extension in the terminal. Hold the cable end approximately 1/2 inch from the engine block, then have someone crank the engine with the starter. Check for a good spark. If a good spark occurs, the electronic system is O.K. Check the distributor cap, rotor, spark plugs, cables and carburetion. (Figure 38)

If no spark occurred, remove the distributor cap, rotor and shield, align a trigger wheel tooth with the center of the sensor and check sensor air gap, which should be .008". Note that the sensor will operate from a very small gap to quite a large gap. If the gap is out of spec, reset to .008" and repeat the spark test. Be sure that the distributor shaft turns and is not broken or bent. (Figure 39)

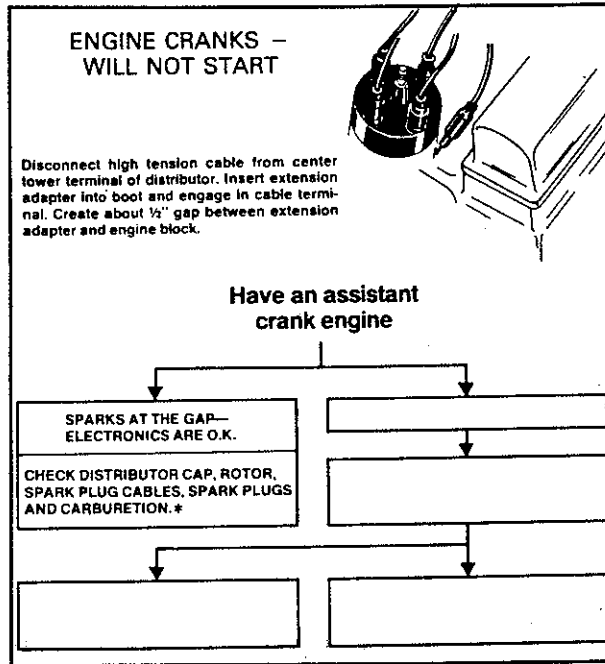


Figure 38 Engine in No Start Condition

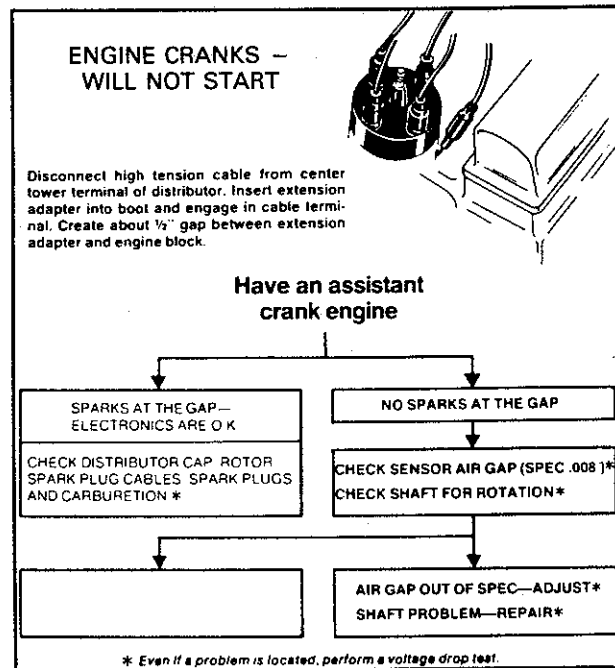


Figure 39 Spark Testing in No Start Condition

If the problem has not been located, it will be necessary to perform primary system voltmeter tests. (Figure 40)

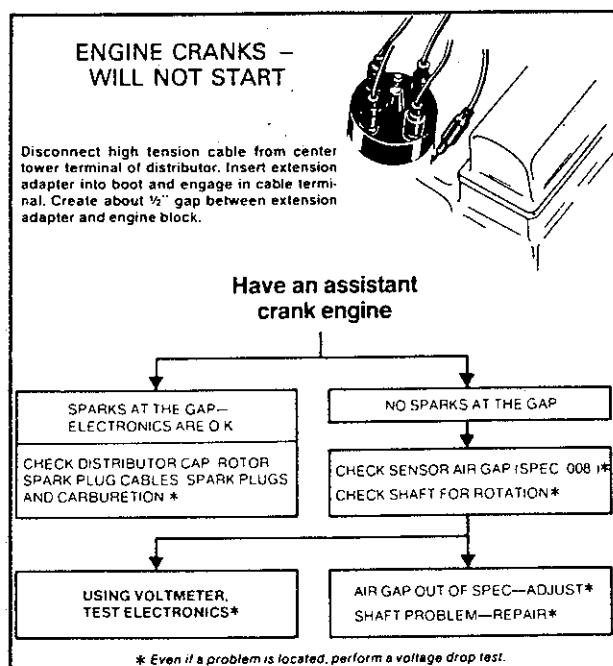


Figure 40 Voltmeter Testing in No Start Condition

## PRIMARY SYSTEM VOLTAGE TESTS

First position the trigger wheel so that the sensor is between 2 teeth. This is comparable to "points closed". Turn on the ignition switch. Primary current should flow. Connect a voltmeter across the battery terminals. Let's call this (V-1). **(V-1 should read between 12 and 13 volts.)** If the battery is low, charge it. (Figure 41)

Now connect the voltmeter between the coil positive terminal and ground. Let's call this (V-2). (V-2) should read within one volt of that which you read at the battery. Normally the reading will be about 1/2 volt lower. If (V-2) reads low, a fault exists. (Figure 42) The voltage drop test (V-4) will help you find it. Perform a voltage drop test. Refer to Figures 49 and 50 on page 2-33.

Now, connect voltmeter between the coil negative terminal and ground. Let's call this (V-3). (V-3) should read somewhere between 4 and 8 volts. (Figure 43)

If (V-3) indicates 4-8 volts, this is normal. Now place a screwdriver in front of the sensor face. If (V-3) now indicates 12 to 13 volts, either

the coil or the electronics is faulty. Test the coil or substitute a good coil. Repeat screwdriver test. If still no spark occurs, replace electronics.

When installing new electronics, it will be necessary to adjust sensor to trigger wheel air gap to .008". (Figure 44)

If (V-3) does not change when the screwdriver is placed in front of the sensor or indicates less than 12 volts, the electronics are faulty and must be replaced. (Figure 45)

If (V-3) did not indicate 4 to 8 volts, a fault exists and must be corrected. Let us consider a (V-3) reading or less than four volts, which in all probability will be zero. (Figure 46)

If (V-3) reads less than 4 volts, remove the wire from the coil negative terminal and reconnect (V-3) to coil negative. (Figure 47)

If (V-3) now reads 12 to 13 volts, it is an indication that the coil primary winding has continuity and the electronics are shorted. Replace the distributor electronics. If (V-3) reading has not changed, it indicates a faulty coil, the primary winding is open. Replace the coil. (Figure 48)

The other condition which could exist, is that (V-3) would indicate more than 8 volts, which in all probability would be 12-13, the same as (V-2). This would indicate an open ground circuit and is highly improbable. However, check the distributor for a good ground. If it is O.K., replace the electronics. (Figure 49)

Position the sensor between two trigger wheel teeth. Connect (V-4's) positive lead to the battery positive post and (V-4's) negative lead to the coil positive terminal. With the ignition switch "on", (V-4) should read less than one volt, normally, about 1/2 volt. If the reading is O.K., don't stop but complete the test (Figure 50).

Check for poor circuit conditions by flexing, that is, wiggling the connections at the battery cables, starter solenoid, bulk head connectors, ammeter terminals, and ignition switch. The diagram shown is typical. Your application may be different. (Figure 51)

Not all analyzers are compatible with this Prestolite electronic ignition system. Be sure to use a tachometer dwell rpm analyzer, such as a Rotunda (055-00101) Inductive Multimeter Analyzer (ordering information 1-800-762-6181).

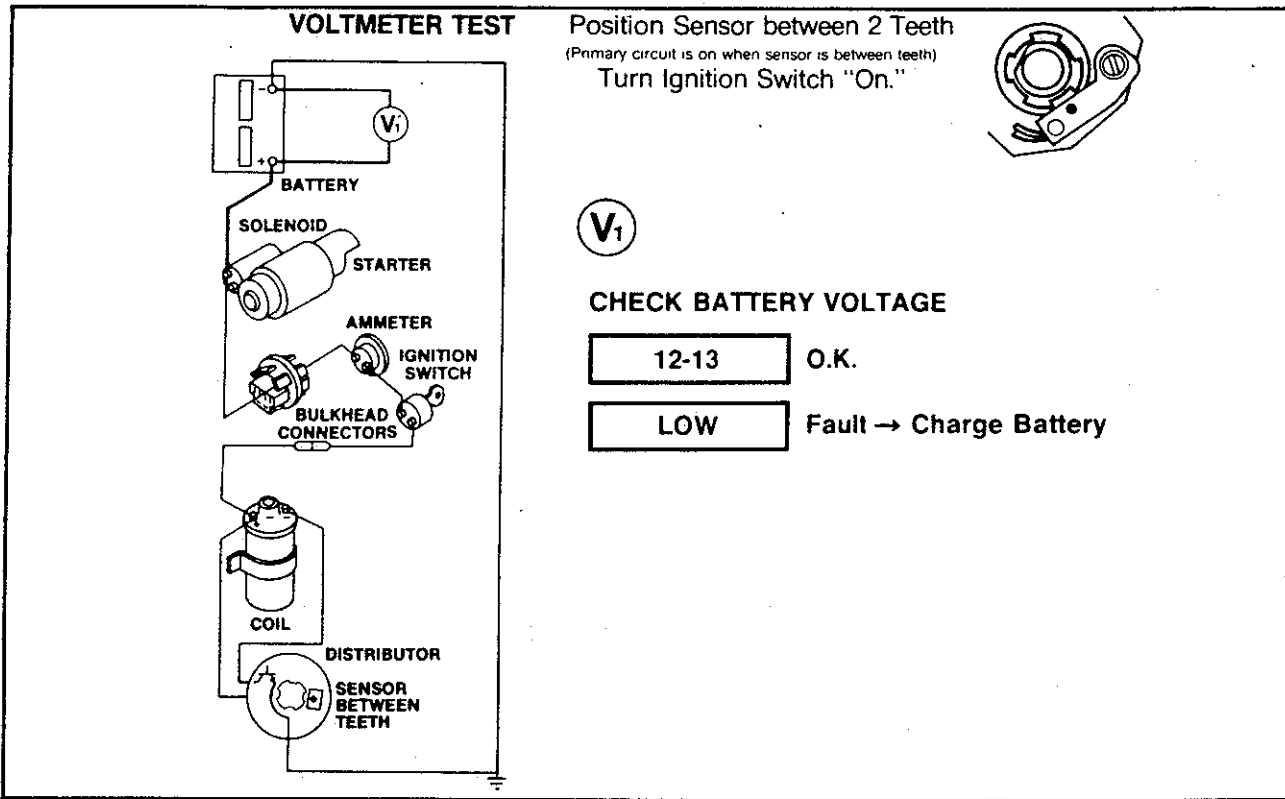


Figure 41 Voltmeter Test (1 of 9)

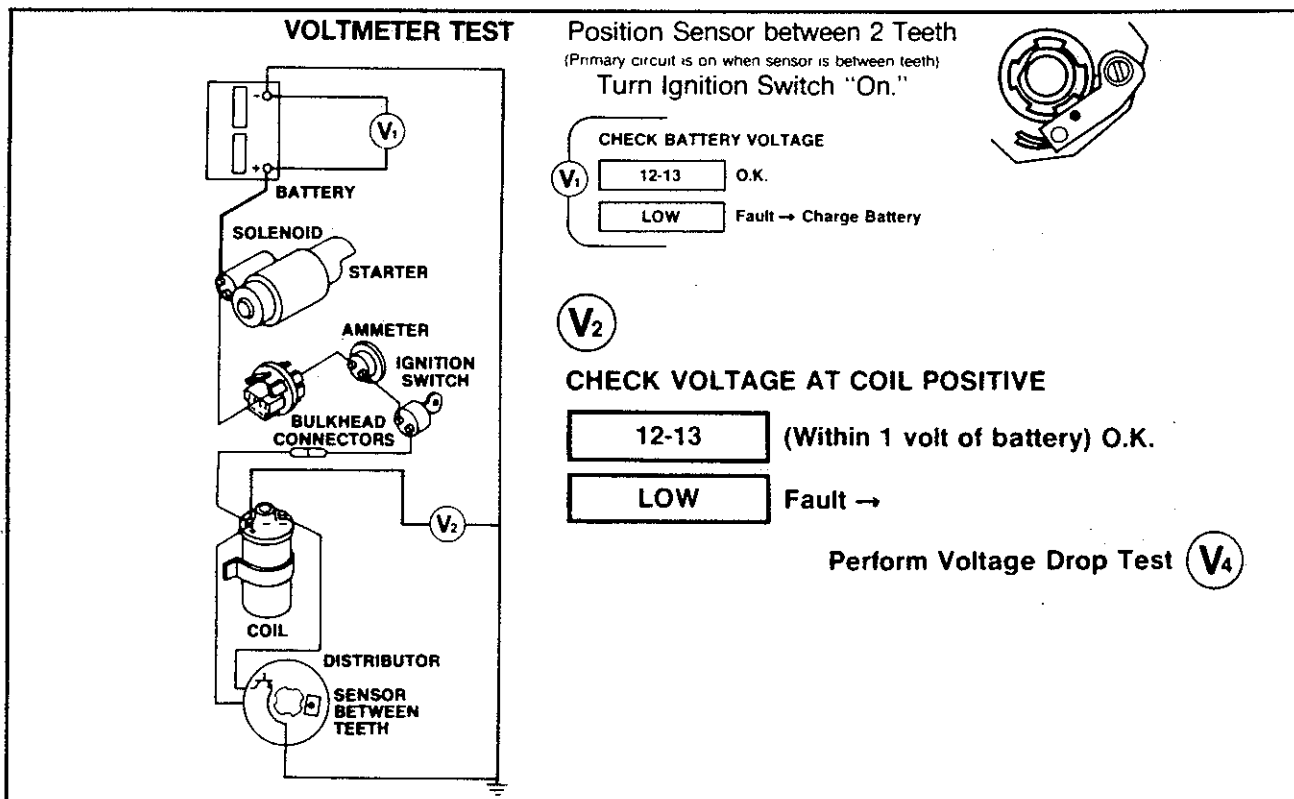


Figure 42 Voltmeter Test (2 of 9)



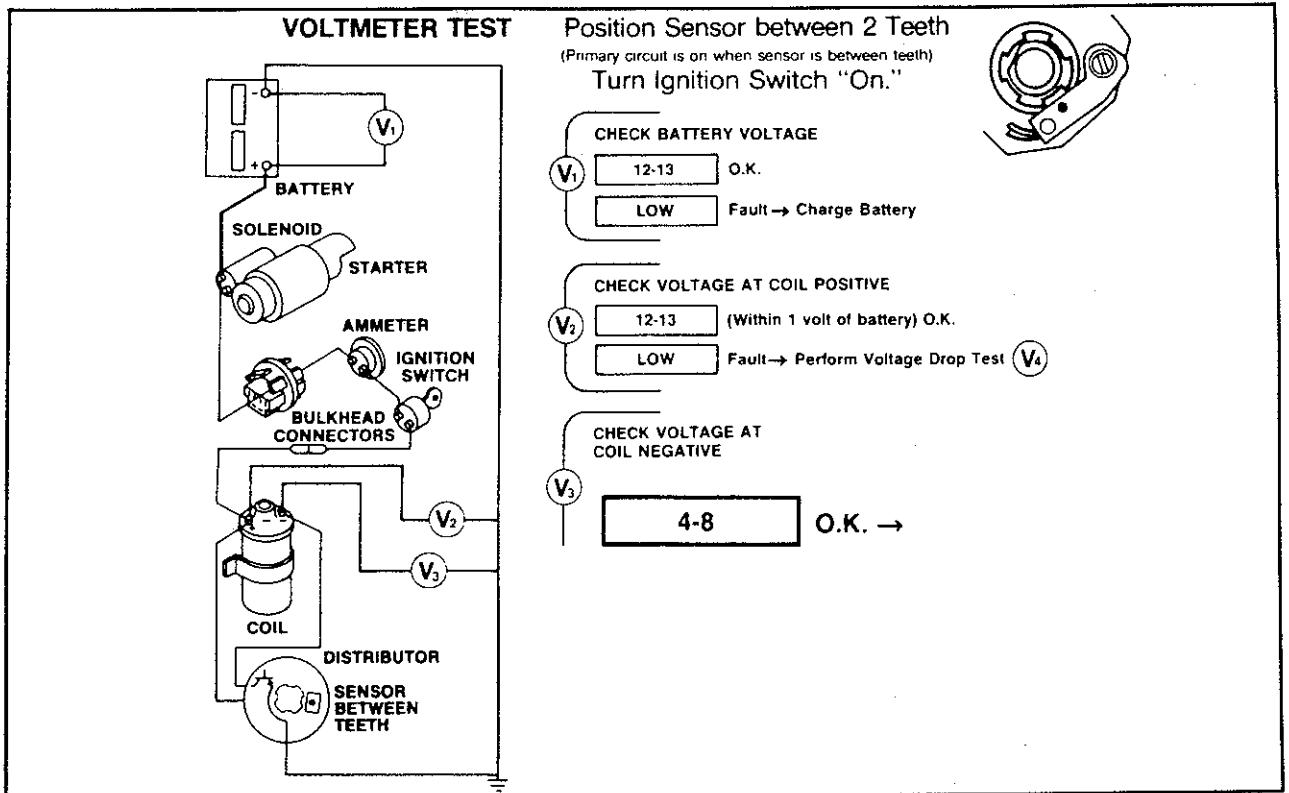


Figure 43 Voltmeter Test (3 of 9)

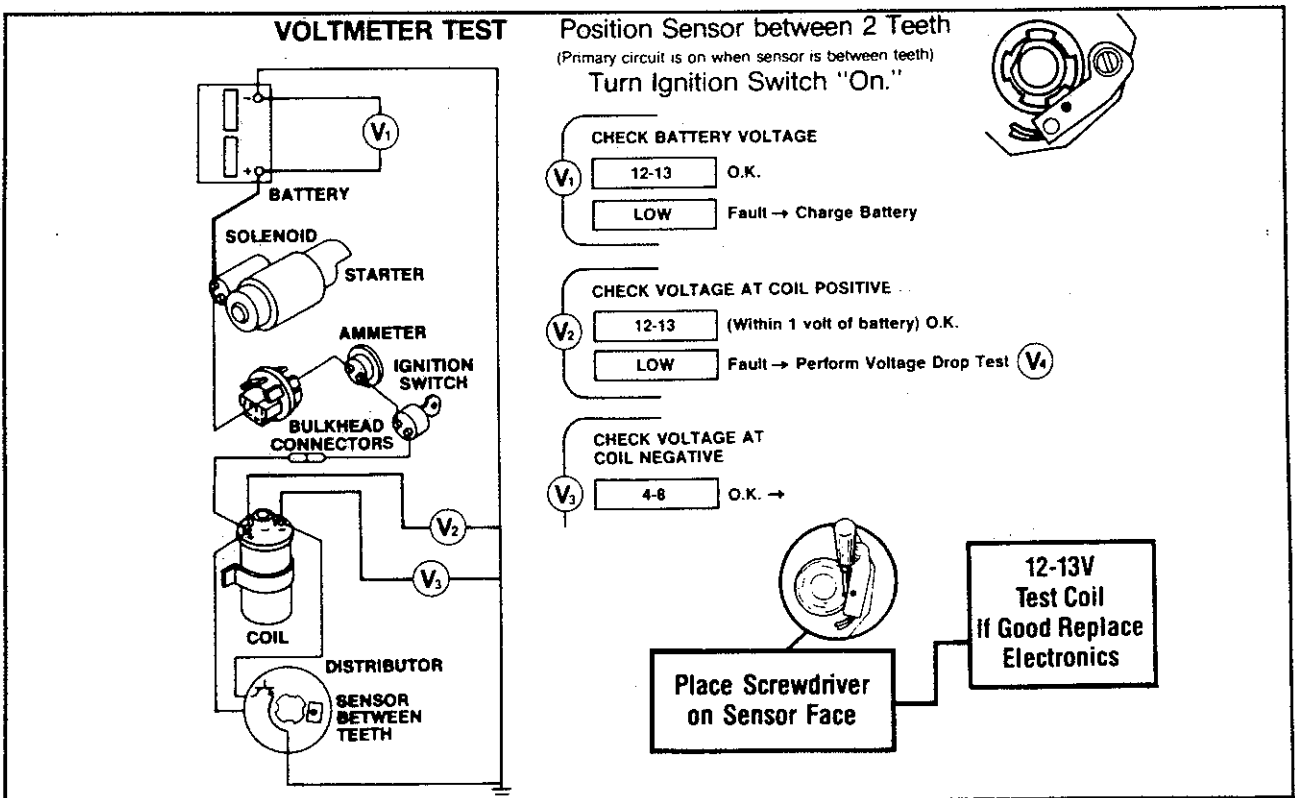


Figure 44 Voltmeter Test (4 of 9)

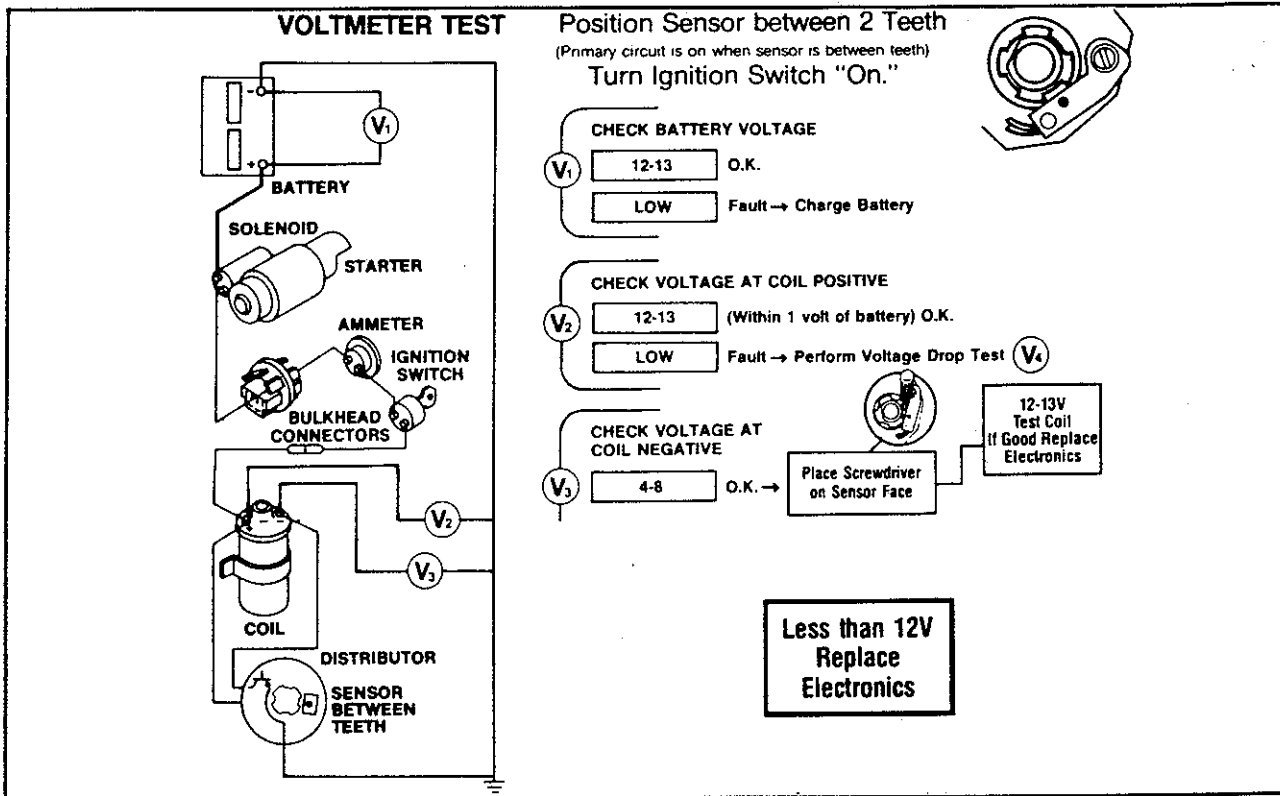


Figure 45 Voltmeter Test (5 of 9)

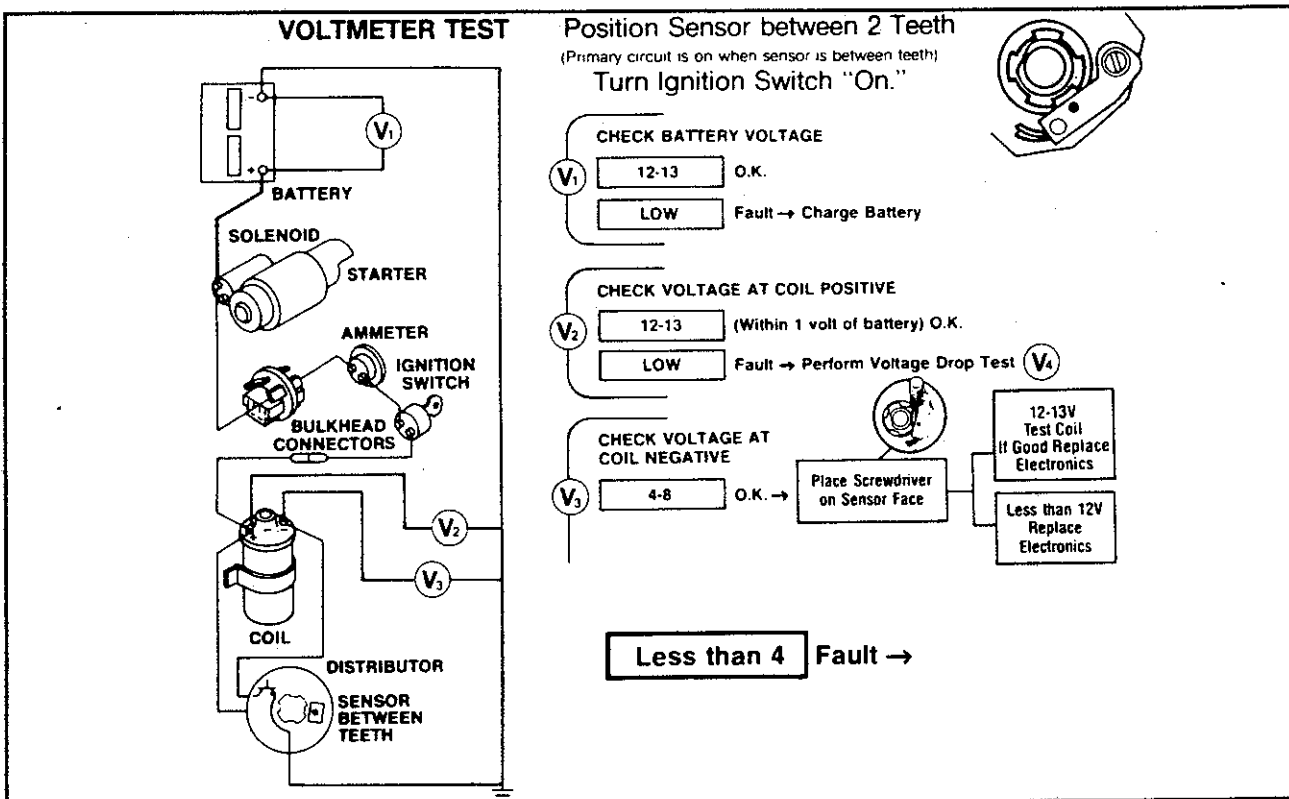


Figure 46 Voltmeter Test (6 of 9)

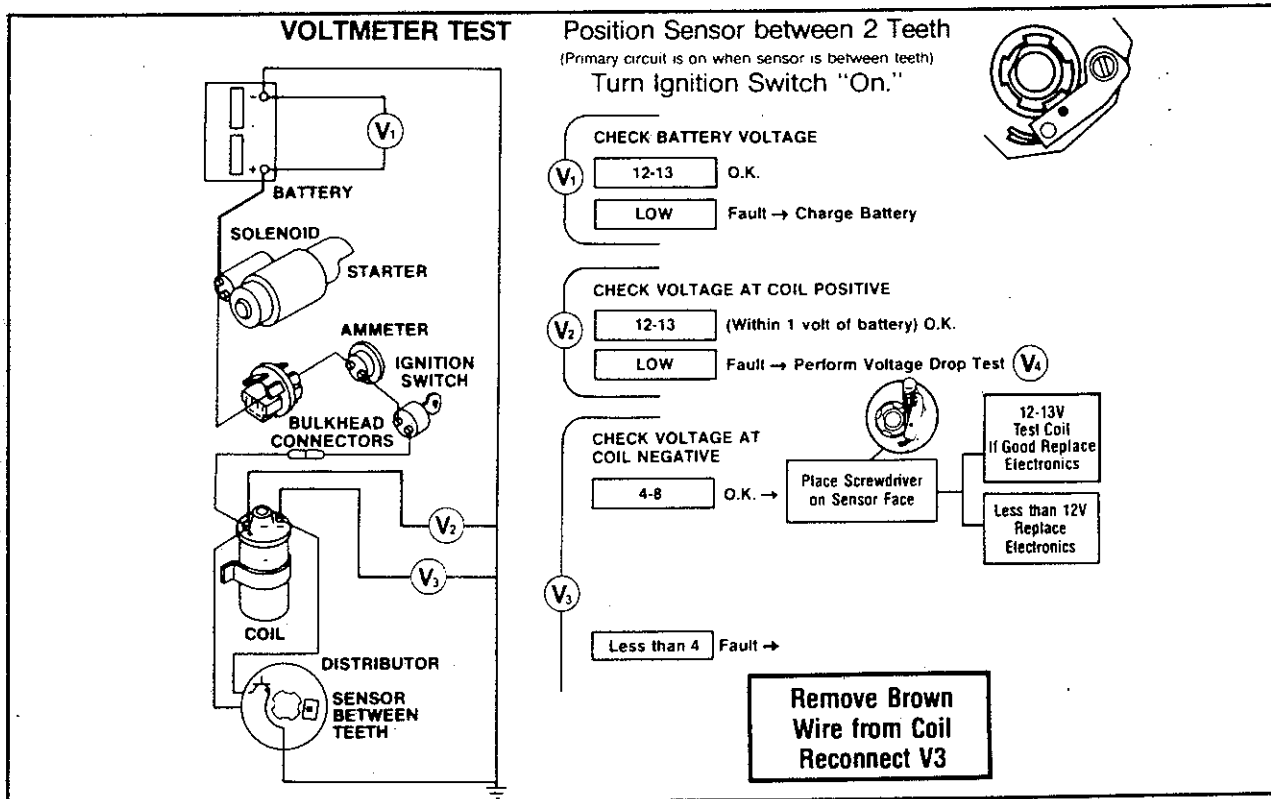


Figure 47 Voltmeter Test (7 of 9)

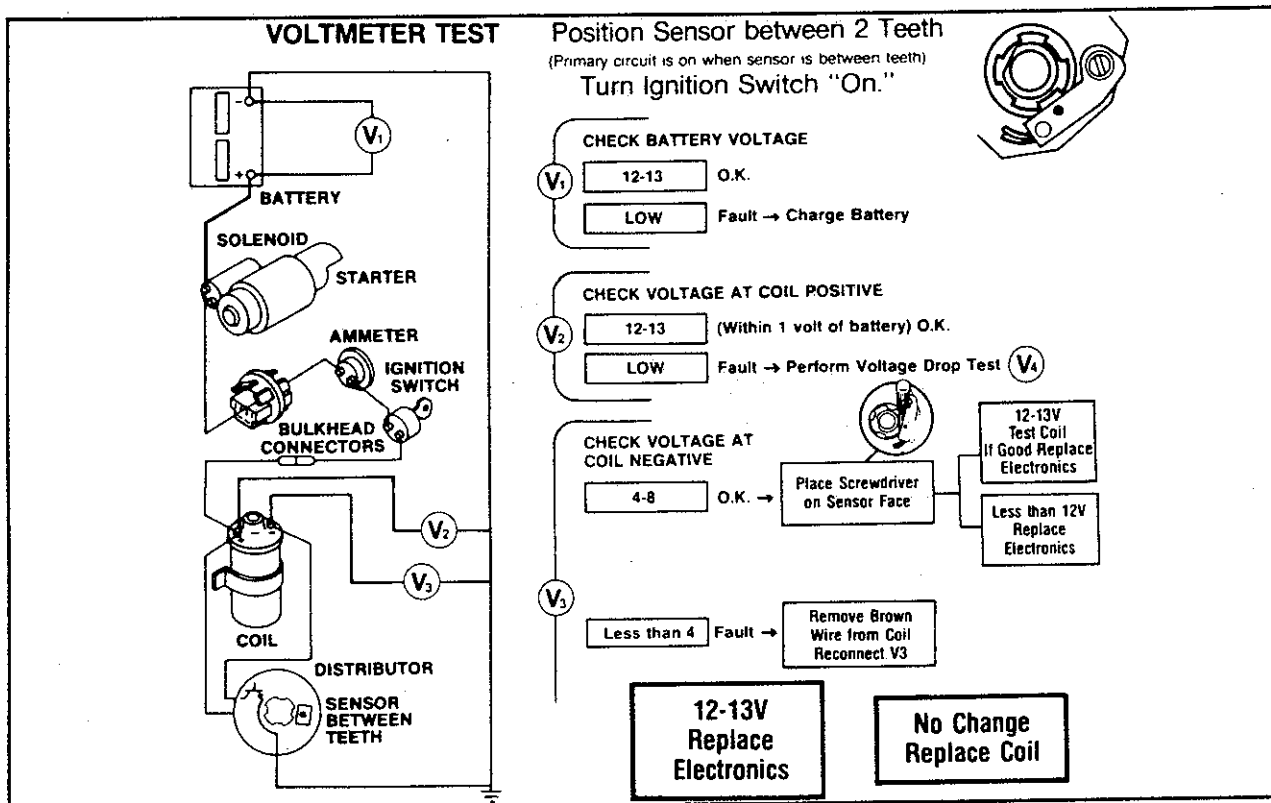


Figure 48 Voltmeter Test (8 of 9)

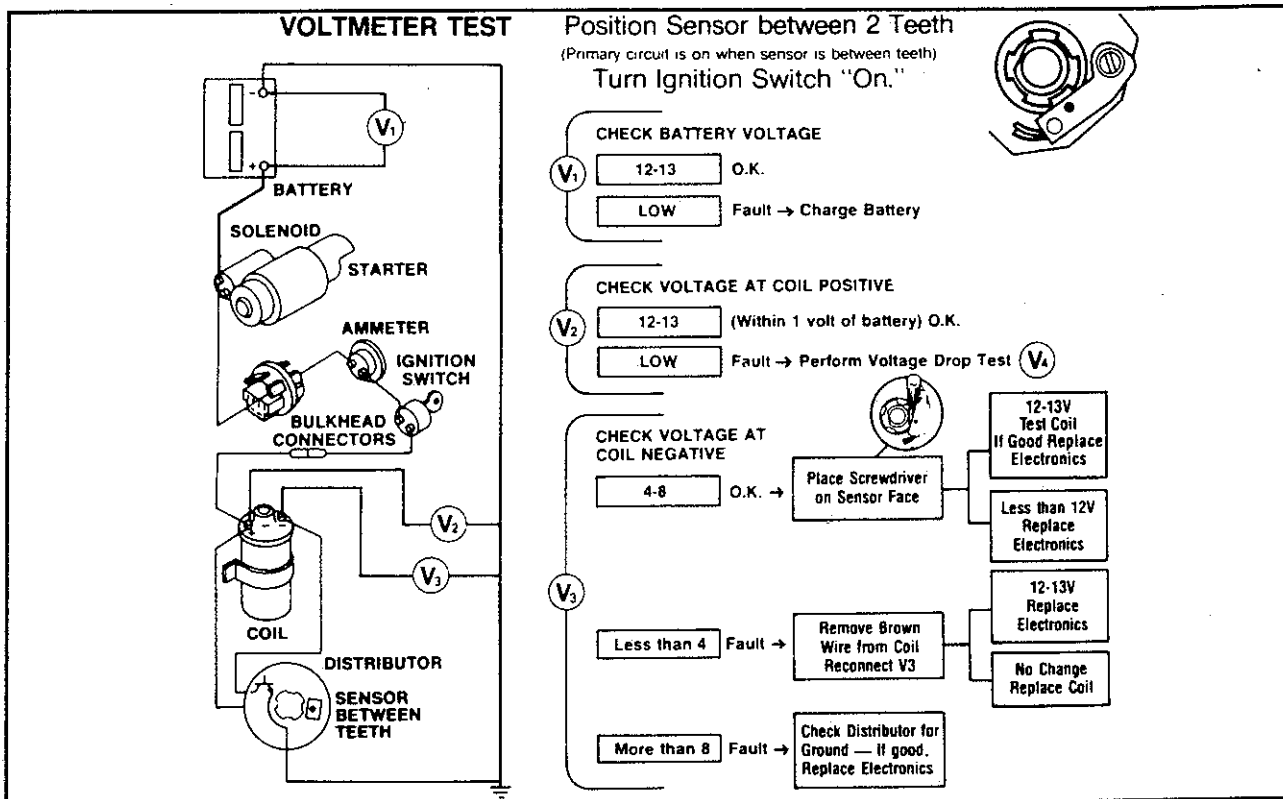


Figure 49 Voltmeter (9 of 9)

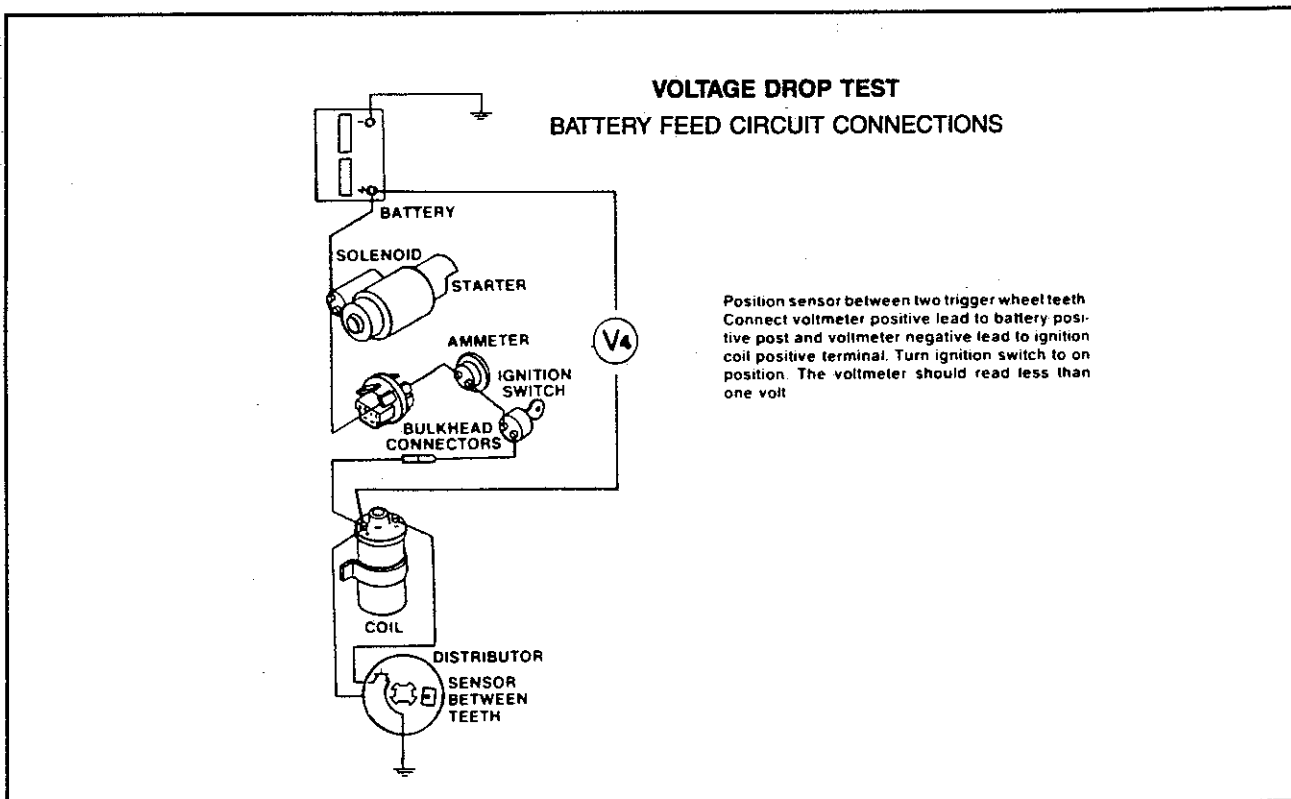


Figure 50 Voltage Drop Test (1 of 2)

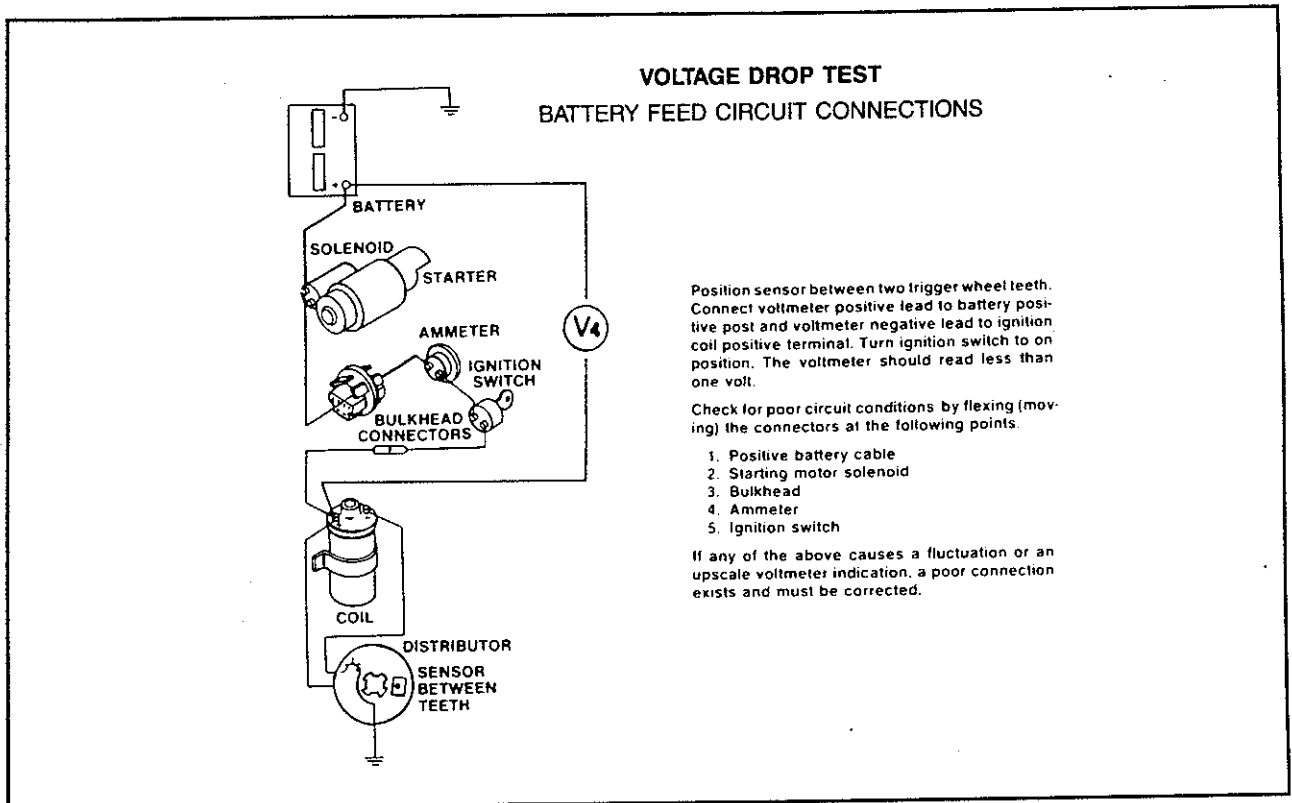


Figure 51 Voltage Drop Test (2 of 2)

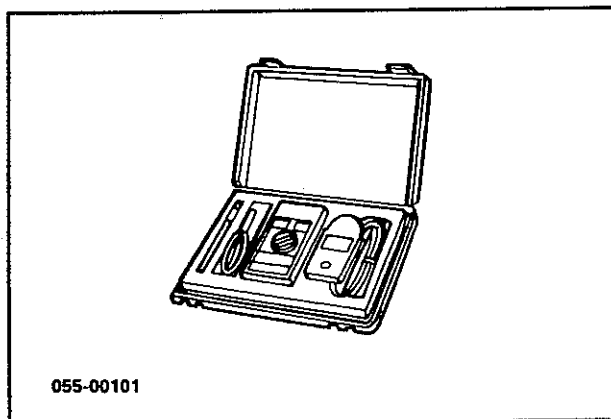


Figure 52 Rotunda Inductive Multimeter Analyzer

Most automotive "scope" analyzers will work well with this system. The pattern observed will be the same as that observed for breaker point type systems, with the exception being a slight hump somewhere in the dwell section. This is normal and is an indication of primary current regulation. Some early analyzers must be modified in order for the cylinder shorting test section of the analyzer to function properly.

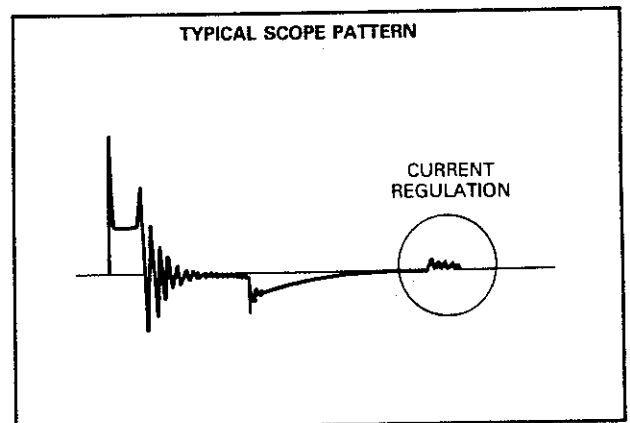


Figure 53 Automotive Analyzers

If these procedures have been followed and corrections properly made, the ignition system will function as designed.