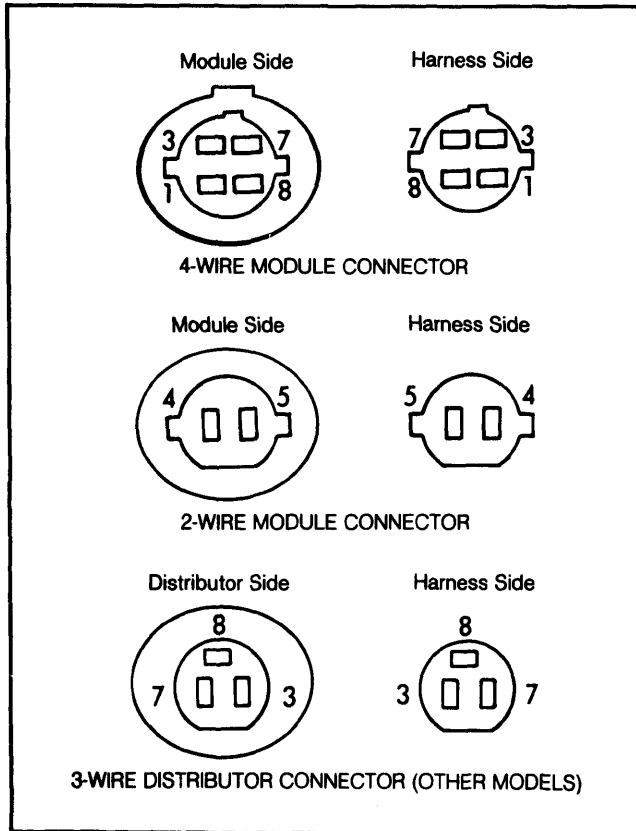


Distributors & Ignition Systems

MOTORCRAFT DURA-SPARK II IGNITION SYSTEM (Cont.)

contain a positive "BATT" terminal, a negative "TACH" (sometimes called "DEC") terminal, and a single secondary terminal.

Fig. 2: Control Module and Distributor Connectors for Dura-Spark II System



Compare terminal location to shape.

Fig. 3: Schematic of Dura-Spark II Ignition System

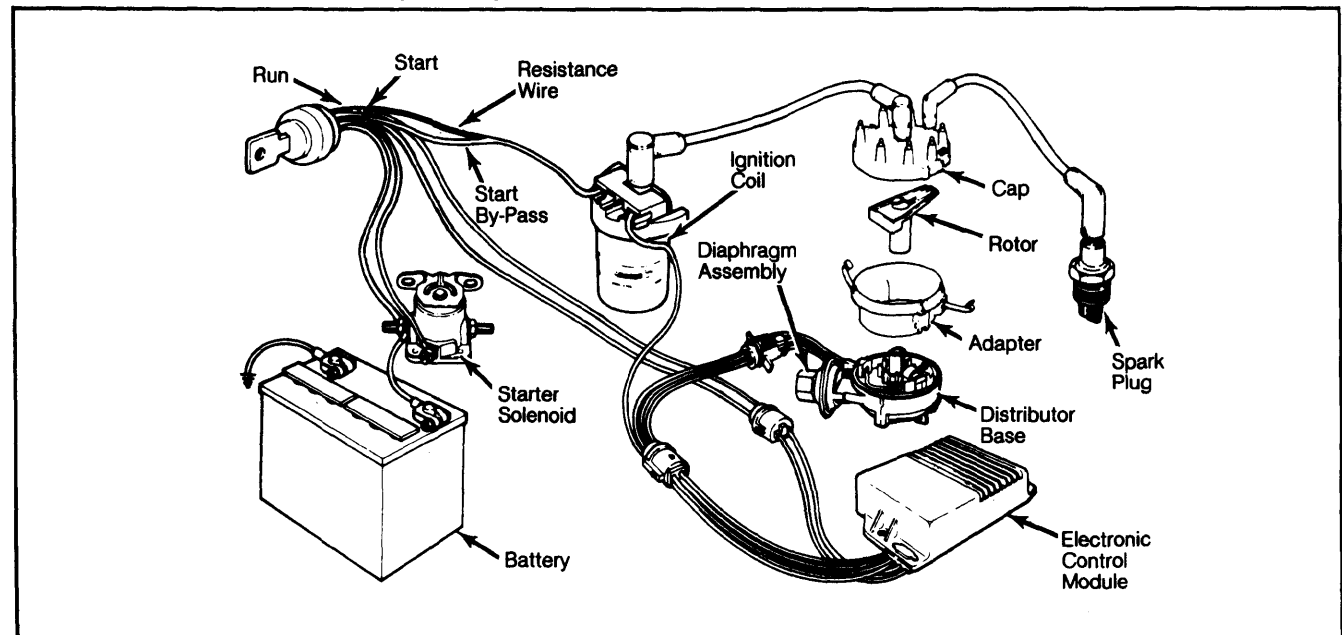


Illustration shows relationship of components to each other.

NOTE: "DEC" refers to Distributor Electronic Control. This terminal is also referred to as the "Tach Test" terminal.

A special connector attaches the Green wire from the control module to the negative terminal ("TACH") and the wire from the ignition switch to the positive terminal ("BATT").

RESISTANCE WIRE

The special ignition resistance wire in the Red wire circuit must be of specified length and diameter to reduce operating voltage.

CAUTION: Under no circumstances should it be replaced by any other wire other than correct service resistance wire.

When new wire is installed, old wire should be removed from system. Resistance value of wire is 1.0-1.1 ohms.

SYSTEM PROTECTION

Dura-Spark systems are protected against electrical currents produced or used by any other vehicle component during normal operation. However, damage to the ignition system can occur if proper testing procedures are not followed.

DURA-SPARK II SYSTEM PRECAUTIONS

Since the electronic control module and ignition coil are "ON" whenever the ignition switch is in the "ON" or "START" position, the system will generate a spark whenever the ignition switch is turned "OFF". This feature may be used as a diagnostic tool to check for continuity of circuit, coil and ignition switch. Some testing precautions follow:

MOTORCRAFT DURA-SPARK II IGNITION SYSTEM (Cont.)

CAUTION: Since a spark may occur if distributor cap is removed with switch "ON", keep switch "OFF" during underhood operations, unless you plan to start the engine or perform a test requiring the switch to be "ON". This will prevent accidental engine rotation during service or test procedures.

NOTE: Silicone dielectric grease must be applied to all insulating areas at distributor (not on cap or rotor, if vehicle is equipped with FM radio), coil and spark plug boots.

NOTE: A $\frac{3}{4}$ " clearance must be maintained at distributor cap mounting edge, spark plug wire terminals, and coil tower to prevent high voltage arc to ground.

NOTE: When replacing spark plug wires, insure wire made of the same material is used for a replacement. Silicone/Silicone wire can be identified by the letters "SS" appearing on the wire in WHITE lettering. Silicone/EPDM wire can be identified by the letters "SE" appearing on the wire in BLACK lettering. The "SS" wire is used on cylinders subject to very high engine temperatures.

NOTE: When removing distributor cap and adapter, always remove the distributor cap first, then the adapter.

ADJUSTMENTS

No adjustments are to be made to the ignition system except initial engine timing and spark plug gap.

TESTING

NOTE: All wire colors shown refer to colors of electronic control module wires. For example, "the Green wire leading to the coil" would refer to any colored wire leading to the coil, that connects to the module's Green wire. Therefore, when making tests, wires must be traced back to control module for proper color identification. Also, when a test is completed and a problem is found, make the necessary repair and repeat the failed test to be sure that the problem has been corrected.

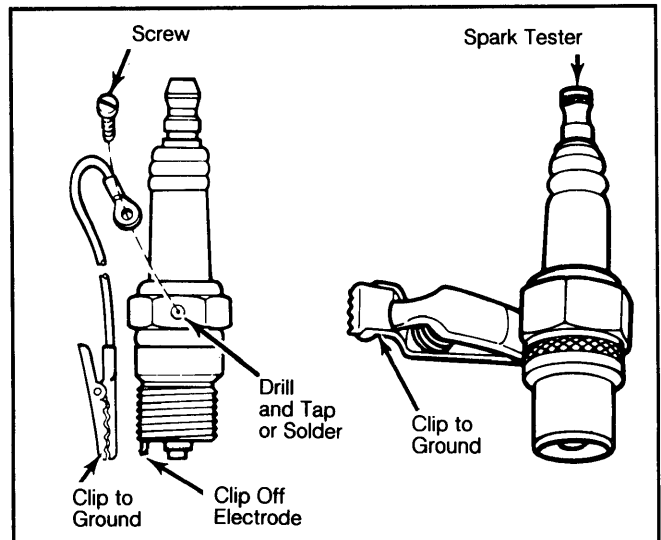
When checking the secondary voltage, do not remove the following spark plug wires while the engine is running or cranking:

- Plug No. 1 or 8 on V8 engines.
- Plug No. 3 or 5 on 6 Cylinder engines.
- Plug No. 1 or 3 on 4 Cylinder engines.

IGNITION SPARK TESTER

Either use an ignition spark tester, or modify a spark plug for use in testing ignition system. To modify plug, cut off side terminal, and install spring clip for grounding plug housing. See Fig. 4.

Fig. 4: Modified Spark Plug and Spark Tester



Testers may be purchased from most tool suppliers.

START CIRCUIT CHECK

1) Connect spark tester or modified spark plug between ignition coil wire and a good engine ground. Crank engine with ignition switch. If no sparks occur at tester gap, proceed to step 2). If sparks occur at tester gap, proceed to "Run Circuits Check".

2) If no sparks occurred in step 1), remove coil wire from distributor cap and ignition coil. Connect ohmmeter leads to both ends of coil wire, and measure resistance.

3) If resistance is more than 5,000 ohms per inch, replace coil wire. Also, inspect ignition coil for damage or carbon tracking. Crank engine to verify distributor rotation and proceed to "Voltage Supply Circuits Check".

RUN CIRCUITS CHECK

1) Remove ignition coil wire from distributor cap, and install spark tester on wire. Turn ignition switch from "OFF" to "RUN" to "OFF" several times.

2) Sparks should occur at tester gap each time switch goes from "RUN" to "OFF" position. Remove spark tester and reconnect coil wire to distributor cap.

3) If sparks occur, check distributor cap, adapter, and rotor for cracks, carbon tracking or lack of silicone compound. Also check for roll pin retaining retractor to sleeve in distributor shaft and check that Orange and Purple wires are not crossed between distributor and control module.

4) If no sparks occurred in step 1), proceed to "Control Module Voltage Check".

CONTROL MODULE VOLTAGE CHECK

1) With ignition switch "OFF", carefully insert small straight pin in Red module wire. See Fig. 5. Attach negative voltmeter lead to distributor base and positive lead to straight pin. Measure battery voltage.

2) Again measure voltage at straight pin in Red wire but with ignition switch in "RUN" position. After reading voltmeter, turn ignition switch "OFF", and remove straight pin.

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MOTORCRAFT DURA-SPARK II IGNITION SYSTEM (Cont.)

3) Voltmeter should now read at least 90 percent of battery voltage (first reading). If so, proceed to "Resistance Wire Check".

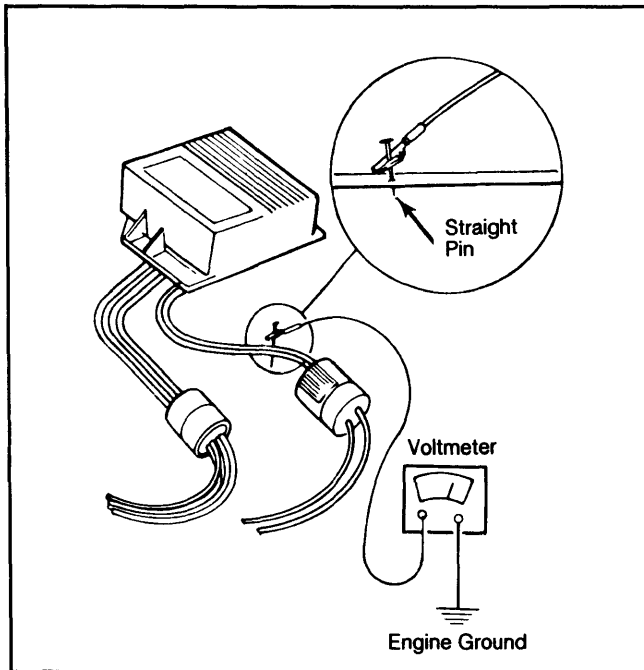
4) If reading was less than 90 percent of battery voltage, check wiring harness between control module and ignition switch. Also check for a worn or damaged ignition switch.

RESISTANCE WIRE CHECK

1) Disconnect control module 2-wire connector and remove coil connector from coil. Connect ohmmeter leads to "BATT" terminal of coil connector and to harness connector terminal mating with Red control module wire. Read ohmmeter, then reconnect all connectors.

2) If resistance is 0.8-1.6 ohms, problem is either intermittent or not in ignition system. If resistance was less than 0.8 or more than 1.6 ohms, replace resistance wire.

Fig. 5: Checking Control Module Run and Start Circuits with Voltmeter



Do not let straight pin touch a ground.

VOLTAGE SUPPLY CIRCUITS CHECK

1) If starter relay has an "I" terminal, disconnect cable between relay and starter motor at starter relay. If starter relay does not have an "I" terminal, disconnect wire to "S" terminal of starter relay. Insert small straight pins in Red and White control module wires.

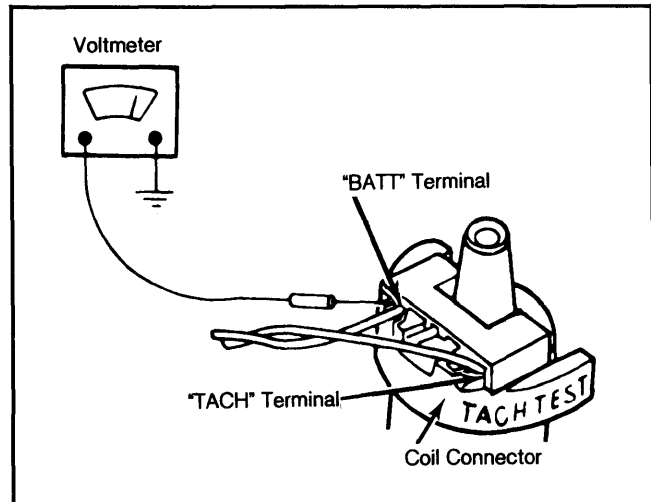
CAUTION: Do not allow straight pins to contact an electrical ground.

2) Measure battery voltage. Connect negative voltmeter lead to distributor base, and note voltmeter reading in each of the following situations:

- Positive voltmeter lead connected to pin in Red wire, with ignition switch in "RUN" position.
- Positive voltmeter lead connected to pin in White wire, with ignition switch in "START" position.

- Positive voltmeter lead connected to "BATT" terminal of ignition coil, with ignition switch in "START" position. See Fig. 6.

Fig. 6: Checking for Battery Voltage at Ignition Coil Positive ("BATT") Terminal



3) Turn ignition switch "OFF". Reconnect any wires disconnected from starter relay. Remove voltmeter leads, and remove straight pins from wires.

4) If voltage readings were at least 90 percent of battery voltage, test result is OK, proceed to "Ignition Coil Voltage Supply Check". If reading was less than 90 percent of battery voltage, check for faulty wiring harness or connectors. Also check for worn or damaged ignition switch.

IGNITION COIL VOLTAGE SUPPLY CHECK

1) Connect negative lead of voltmeter to distributor base and positive lead to "BATT" terminal of ignition coil. See Fig. 6. Turn ignition switch to "RUN" position, and read voltmeter. Turn ignition switch "OFF".

2) If voltage was 6-8 volts, proceed to "Pick-Up Coil & Distributor Wiring Harness Check". If voltage was less than 6 volts or more than 8 volts, proceed to "Ignition Coil Primary Resistance Check".

PICK-UP COIL & DISTRIBUTOR WIRING HARNESS CHECK

1) Disconnect control module 4-wire connector, and inspect for dirt, corrosion or damage. Connect ohmmeter leads to harness connector terminals that mate with Orange and Purple control module wires.

2) Resistance should be 400-1,000 ohms. If so, proceed to "Control Module to Distributor Wiring Harness Check". If resistance is not to specifications, proceed to "Pick-Up Coil Resistance Check".

CONTROL MODULE TO DISTRIBUTOR WIRING HARNESS CHECK

1) Disconnect 4-wire control module connector. Connect an ohmmeter lead to distributor base. Alternately, connect the other ohmmeter lead to wiring harness connector terminals that mate with Orange and Purple wires of control module connector.

MOTORCRAFT DURA-SPARK II IGNITION SYSTEM (Cont.)

2) If resistance is greater than 70,000 ohms, test result is OK. Proceed to "Ignition Coil Secondary Resistance Check". If resistance was less than 70,000 ohms, check wiring harness between control module connector and distributor, including distributor grommet.

IGNITION COIL SECONDARY RESISTANCE CHECK

1) Disconnect ignition coil secondary wire and ignition coil connector from coil. Connect ohmmeter leads to ignition coil "BATT" terminal and to high voltage terminal. Measure resistance and reconnect wire and connector.

2) If resistance is 7,700-10,500 ohms, coil is OK, proceed to "Module-to-Coil Wire Check". If resistance is less than 7,700 or greater than 10,500 ohms, replace ignition coil.

MODULE-TO-COIL WIRE CHECK

1) Disconnect control module 4-wire connector and ignition coil connector. Connect one ohmmeter lead to distributor base and the other to "TACH" terminal of ignition coil connector. Measure resistance and reconnect all connectors.

2) If resistance is greater than 1 ohm, replace control module. If resistance is 1 ohm or less, inspect wiring harness between control module and ignition coil.

PICK-UP COIL RESISTANCE CHECK

1) Disconnect distributor connector from wiring harness. Connect ohmmeter leads to distributor connector

terminals that mate with Orange and Purple wires of control module. Measure resistance of pick-up coil. Reconnect distributor connector to wiring harness.

2) Resistance should be 400-1,000 ohms. If resistance is within this range, pick-up coil is OK, but harness between distributor and control module may be defective. If resistance is not within specified range, replace pick-up coil assembly.

IGNITION COIL PRIMARY RESISTANCE CHECK

1) Disconnect ignition coil connector. Connect ohmmeter leads to "BATT" and "TACH" terminals of ignition coil. Measure resistance, and reconnect ignition coil connector.

2) If resistance is 0.8-1.6 ohms, coil is OK. Proceed to "Primary Circuit Continuity Check". If resistance is less than 0.8 or greater than 1.6 ohms, replace ignition coil.

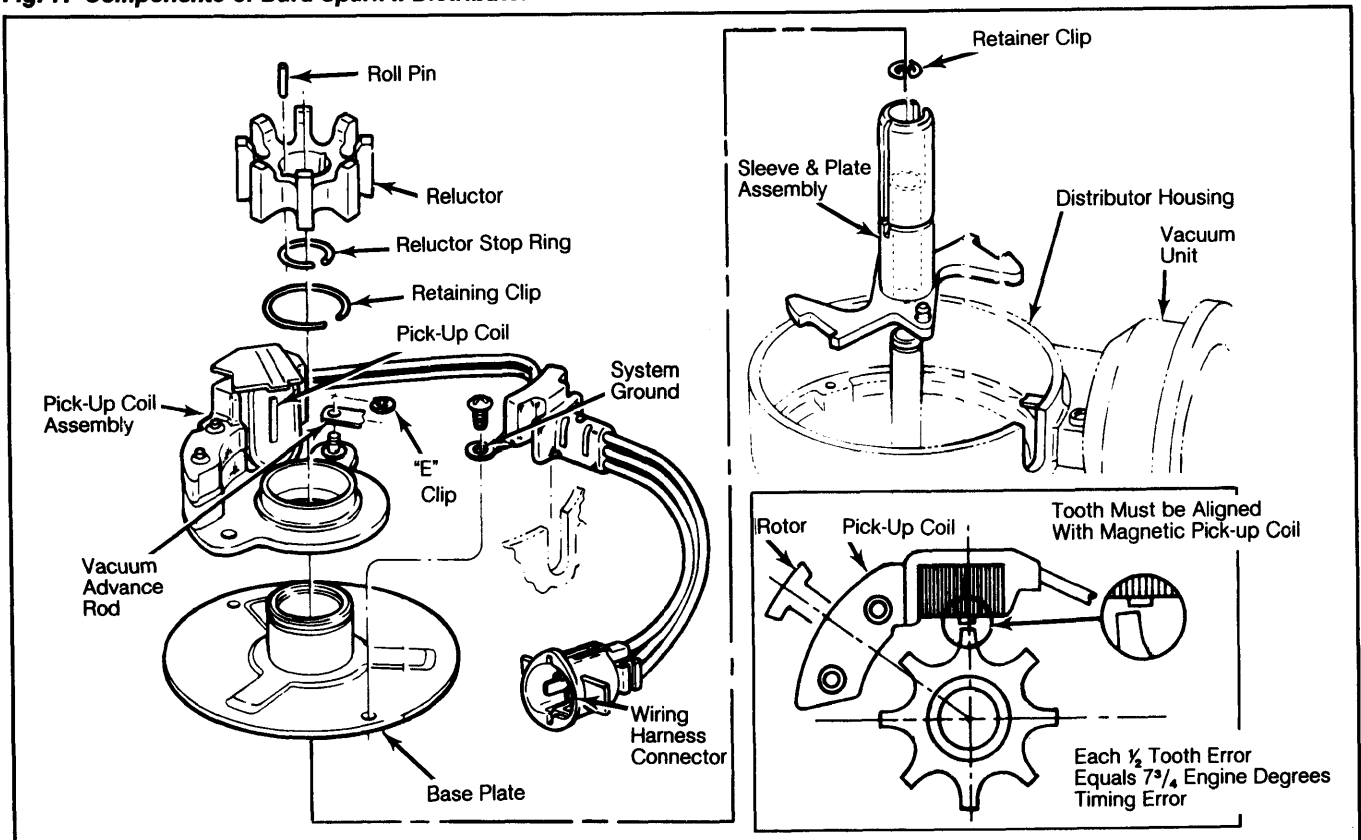
PRIMARY CIRCUIT CONTINUITY CHECK

1) Insert a small straight pin in control module Green wire. Connect negative voltmeter lead to distributor base, and positive lead to pin in Green wire.

2) With ignition switch in "RUN" position, measure voltage. Turn ignition switch "OFF" and remove straight pin from Green wire.

3) If voltage reading was greater than 1.5 volts, proceed to "Ground Circuit Continuity Check". If voltage reading was 1.5 volts or less, replace control module.

Fig. 7: Components of Dura-Spark II Distributor



Reluctor shown, having 8 teeth, is for V8 engine.

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GROUND CIRCUIT CONTINUITY CHECK

1) Insert a small straight pin in control module Black wire. Connect negative lead of voltmeter to distributor base, and positive lead to straight pin in Black wire. With ignition switch in "RUN" position, measure voltage. Turn ignition switch "OFF", and remove straight pin.

2) If voltage reading was greater than 0.5 volt, proceed to "Distributor Ground Circuit Continuity Check". If voltage was 0.5 volt or less, replace control module.

DISTRIBUTOR GROUND CIRCUIT CONTINUITY CHECK

1) Disconnect distributor connector from wiring harness. Connect ohmmeter leads to distributor base, and to Black wire terminal in distributor connector. Measure resistance, then reconnect distributor connector to wiring harness.

2) If resistance was less than 1 ohm, circuit is OK. If resistance was greater than 1 ohm, check ground screw in distributor housing.

SPARK PLUG WIRE RESISTANCE CHECK

1) Remove distributor cap, and disconnect spark plug end of suspected wire or wires. Connect ohmmeter leads to spark plug terminal and terminal inside distributor cap (each end of wire).

CAUTION: Never puncture a spark plug wire when measuring resistance.

2) If resistance is less than 5,000 ohms per inch, visually inspect wires for damage and remove spark plug for inspection and/or replacement. If resistance is greater than 5,000 ohms per inch, disconnect suspected wire from distributor cap and again connect leads to each end of wire.

3) If resistance is now less than 5,000 ohms per inch, inspect distributor cap and spark plug wire terminals for damage. Repair as necessary. If resistance is still greater than 5,000 ohms per inch, replace wire(s).

OVERHAUL

DISASSEMBLY

1) Remove distributor cap, adapter, and rotor. Disconnect distributor wiring harness plug. Using a small gear puller or two screwdrivers, carefully pry armature from sleeve and plate assembly. Remove spring pin.

CAUTION: Do not pinch stator wires when removing armature.

2) On V8 engines, remove large wire retaining clip from base plate annular groove. Remove ground screw base, and pull up to remove rubber grommet from base.

3) Remove "E" clip securing diaphragm rod advance link to stator assembly. Lift diaphragm rod off post on stator assembly, and move it out against housing. Remove stator assembly.

4) On 6-cylinder models, remove "E" clip washer and wave washer, securing stator assembly to lower plate. Remove stator assembly ground screw and lift assembly from distributor.

REASSEMBLY

Reverse disassembly procedure. Using new roll pin, install roll pin in different groove, 180° from original groove.