CHRYSLER CORP. ELECTRONIC IGNITION

Chrysler Corp.
3.7L (225") 6-Cylinder Engine
Federal Only

DESCRIPTION

All Federal 225" 6-cylinder engines use Chrysler Corp. Electronic ignition. This system consists of an electronic control unit, a dual pick-up distributor (with a reluctor and two magnetic pick-up assemblies), a dual pick-up start-run relay, an ignition coil, a single ballast resistor and both vacuum and centrifugal advance mechanisms. See *Fig.1*.

The control unit is connected to the rest of the system through a 4-wire connector. The distributor is connected to the control unit by two 2-wire connectors.

NOTE – *There is no terminal 3 on the control unit.*

The dual pick-up start-run relay permits use of a dual pick-up distributor without electronic spark advance. This results in increased timing and improved fuel economy.

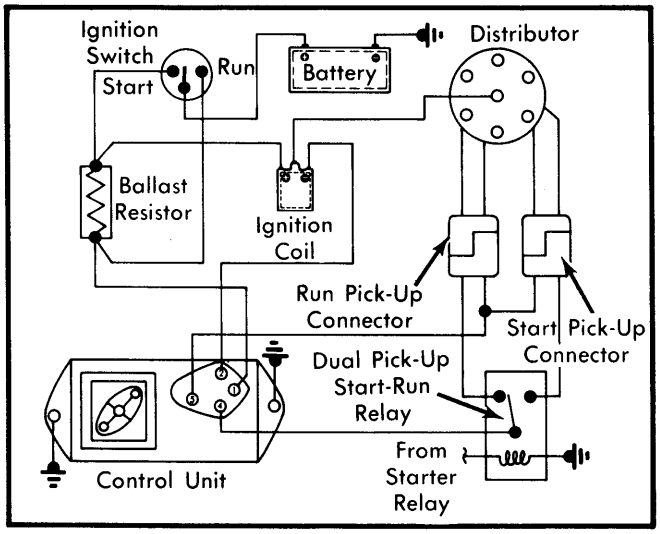

Fig. 1 Electronic Ignition Wiring Diagram for Chrysler Corp. 225" Federal Engines (NOTE: No Pin No. 3 on Control Unit)

OPERATION

DISTRIBUTOR

The distributor has a toothed wheel, called a reluctor, instead of the conventional cam. It has one tooth for each of the engine's 6 cylinders. Normal breaker points are replaced by a dual pick-up coil assembly, composed of 2 fine wire coils, magnets, and pole pieces. See *Fig. 2*.

During cranking, current flows to the distributor through the start pick-up circuit of the dual pick-up start-run relay. Once the engine begins to run, the relay switches back to the run pick-up circuit. A weak magnetic field is created around the "live" pick-up coil.

As the distributor shaft turns, the reluctor teeth pass the "live" pick-up coil assembly (only one pick-up coil operates at a time), interrupting the magnetic field and creating an electronic signal. This signal is transmitted to the control unit, which shuts off current to the primary circuit of the ignition coil.

As no moving parts contact each other in the distributor, there is no wear and therefore no need for regular adjustment.

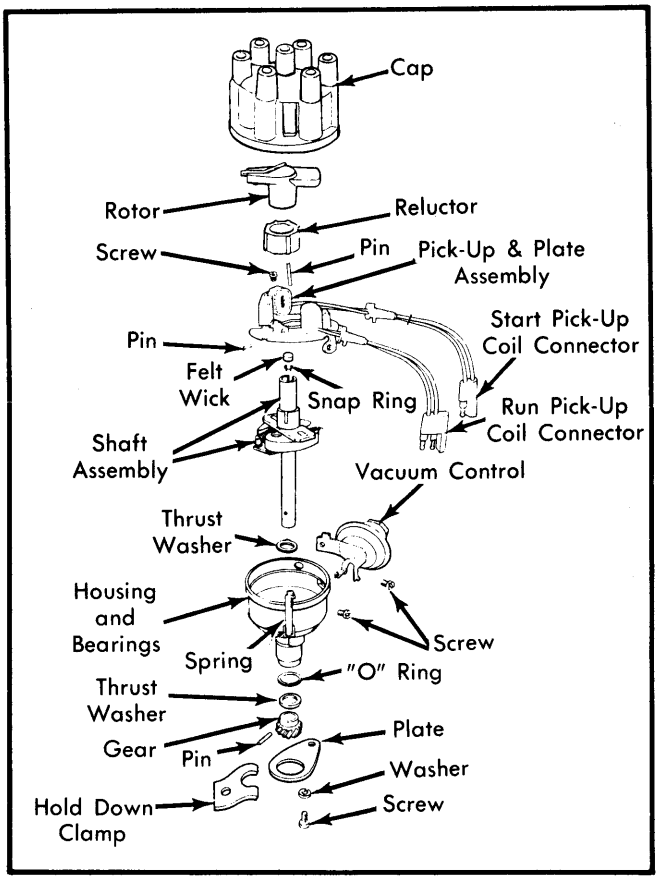

Fig. 2 Exploded View of Distributor Used on Federal 225" 6-Cylinder Engines

ELECTRONIC CONTROL UNIT

The electronic control unit is located in a metal housing on the firewall. A switching transistor is exposed on top for more efficient cooling. The control unit is connected to the rest of the system by a wiring harness and a 4-wire connector. The control unit functions whenever the ignition switch is turned to the "START" or "RUN" positions.

In the "START" position, it furnishes current through the dual pick-up start-run relay, to the start pick-up in the distributor. In the "RUN" position, it furnishes current through the switched relay to the distributor's run pick-up.

The signal created, as the reluctor teeth pass the "live" pick-up coil, is transmitted by the control unit to the primary circuit of the ignition coil. As current to the primary is cut off, the magnetic field there collapses, causing a voltage surge in the secondary windings. This fires the spark plugs.

The length of time current is permitted to flow through the coil's primary circuit (dwell time) is determined by the control unit and is not adjustable.

BALLAST RESISTOR

A single 2-pin ballast resistor is used. During cranking, the resistor is by-passed, allowing full battery voltage to flow to

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the coil. In low speed operation, the ballast resistor limits voltage to the coil, protecting it from overheating. As engine speed increases, the ballast resistor allows the coil to charge faster to prevent voltage loss.

ADJUSTMENT

PICK-UP COIL AIR GAP

1) To set START pick-up coil air gap, loosen hold-down screw and align 1 reluctor tooth with pick-up coil pole. Install .006" non-magnetic feeler gauge between reluctor tooth and pick-up coil pole. See *Fig. 3*. Move pick-up coil assembly until contact is made between pick-up coil pole, feeler gauge and reluctor tooth. Tighten hold-down screw and remove feeler gauge. Gauge should not require force during removal.

2) Check air gap of START pick-up coil, using an .008" non-magnetic feeler gauge. It should not fit in gap. Do not force it to fit. Apply vacuum to vacuum unit and rotate distributor shaft. Pick-up coil pole should not strike reluctor teeth. If so, gap is incorrectly set. If pick-up coil pole strikes teeth only on 1 side, distributor shaft is probably bent, requiring replacement.

NOTE – *Both pick-up coil air gaps are adjusted in the same manner. However, when adjusting the RUN pick-up coil gap, set it with an .012" feeler gauge and check it with an .014" gauge.*

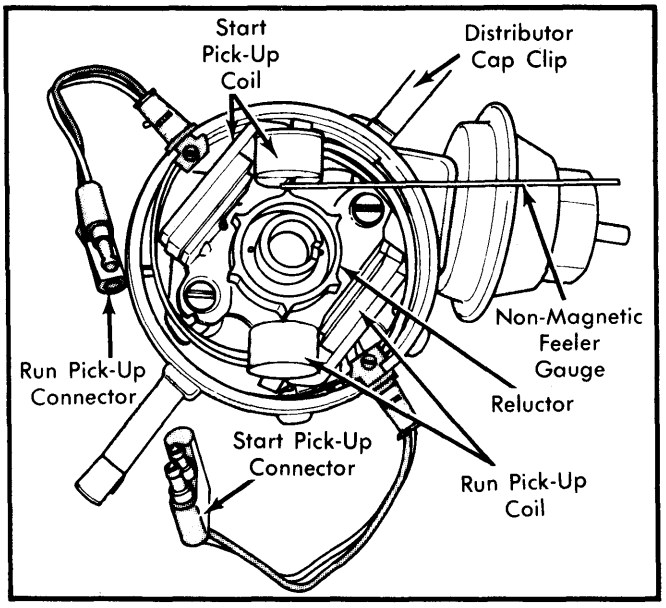

Fig. 3 Checking Air Gap of Dual Pick-Up Distributor's Run Pick-Up Coil

TESTING

NOTE – *If a suitable tester (C-4166 with adapter C-4166-1 or C-4166-A, or tester C-4503 with adapter C-4503-3) is available, use tester and follow manufacturer's instructions. If tester is not available, proceed as follows:*

Check that all secondary cables, primary wire at coil and ballast resistor are not excessively loose or cracked. Use a voltmeter with a 20,000 ohm/volt rating and an ohmmeter that uses a 9 volt battery for its operation. Check calibration of both meters. Check and record battery voltage reading using a voltmeter. Proceed with following tests.

CAUTION – *When removing or installing wiring connector, ignition switch must be in "OFF" position.*

DUAL PICK-UP START-RUN RELAY

1) Turn ignition switch "OFF". Remove 2-wire connector from dual pick-up start-run relay terminals 4 and 5. Using an ohmmeter, connect leads to terminals 4 and 5 of relay. See *Fig. 4*.

2) Resistance reading should be 20-30 ohms. If not to specification, replace start-run relay.

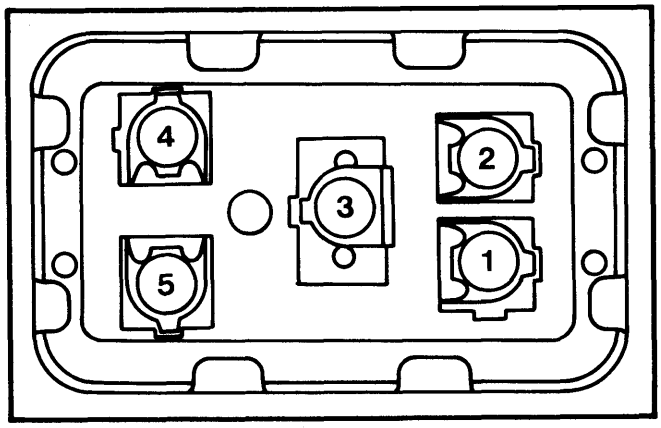

Fig. 4 Dual Pick-Up Start-Run Relay Terminal Locations

SYSTEM VOLTAGE CHECK

1) Remove coil secondary wire from distributor cap. Turn ignition switch "ON". Connect a jumper wire momentarily from ignition coil negative terminal to ground, while holding secondary wire ¼" from engine ground. A spark should jump to ground.

2) If spark was present, proceed to "Wiring Harness and Connector." If no spark was obtained, turn ignition switch "OFF". Disconnect 4-wire harness connector from electronic control unit.

3) Turn ignition switch "ON". Repeat step **1)**. A spark should again be obtained. If so, replace electronic control unit.

4) If no spark was obtained in step **3)**, measure voltage at coil positive terminal. It should be within 1 volt of battery voltage. If so, check for battery voltage at coil negative terminal. If you get battery voltage but no spark in step **3)**, replace ignition coil.

5) If no battery voltage was present at ignition coil positive terminal in step **4)**, replace starter relay and check wiring between battery positive terminal and coil positive terminal. If continuity does not exist, check ballast resistor.

WIRING HARNESS & CONNECTOR

Measure voltage across battery terminals, record this measurement. Turn ignition switch "OFF", then disconnect harness connector from control unit. Connect voltmeter negative lead to a good ground and then turn ignition "ON". Make checks as follows.

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1) Connect voltmeter positive lead to control unit harness connector cavity 1. Reading should be battery voltage. If not, check and repair wires and components from harness connector cavity 1 back to battery. See *Fig. 1*.

2) With voltmeter negative lead still connected to ground, connect positive lead to harness connector cavity 2. Voltmeter should again read battery voltage. If reading is not to specification, check voltage at each connection (coil negative terminal, coil positive terminal, ballast resistor, ignition switch, etc.) back to battery. Repair wiring or replace components as necessary.

3) If reading jumped to battery voltage on positive side of ignition coil, check coil primary and secondary resistance. If coil is bad, replace it. Also check ballast resistor by disconnecting wires from resistor and then taking an ohmmeter reading across its 2 terminals. Resistance should be 1.12-1.38 ohms. If reading is not as specified, replace resistor.

NOTE: This is the Harness Connector, NOT Connector Mounted on Control Unit.

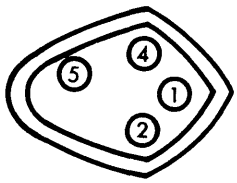

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Fig. 5 Identification of Control Unit Harness Connector Terminals

DISTRIBUTOR PICK-UP COILS

1) Turn ignition switch "OFF". Disconnect control unit harness connector. Connect ohmmeter leads to cavities 4 and 5 of harness connector. See *Figs. 1 and 5*. Ohmmeter reading should be 150-900 ohms. If reading is not to specifications, make same check at each 2-wire connector leading to distributor. If readings at pick-up coils are now correct, start-run relay or harness from control unit to distributor is defective. If readings are still not correct, replace faulty pick-up coil assembly.

2) Connect one ohmmeter lead to a good ground (distributor housing). Connect other lead to either terminal of start pick-up coil distributor connector, then to either terminal of run pick-up coil connector. If ohmmeter shows a reading for either test, replace faulty pick-up coil.

ELECTRONIC CONTROL UNIT GROUND CIRCUIT

1) Connect one ohmmeter lead to a good ground and other lead to control unit connector pin 5 (not cavity 5 of harness connector). Ohmmeter should show full continuity.

2) If not, make sure control unit is making good contact with ground at hold-down bolts. If it is, replace control unit.

CENTRIFUGAL ADVANCE CURVE

Install distributor in test stand. It is important that appropriate adapter for checking electronic type distributors be used. Adjust tester speed control to operate distributor at speeds called for in distributor tables. If advance is not according to specifications, replace distributor shaft assembly (shaft, reluctor sleeve, governor weights).

IGNITION COIL RESISTANCE

1) Coil is designed to operate with an external ballast resistor. When testing coil for output and resistance, also make resistor tests. Also inspect coil for external cracks and arcing.

2) To check coil primary resistance, isolate coil from rest of system. Connect ohmmeter leads to positive and negative primary terminals. To check secondary resistance, connect ohmmeter leads to coil negative terminal and coil tower.

3) If resistance readings are not to specifications, replace ignition coil.

Resistance Specifications

Application	Ohms@70-80°F
Primary Resistance	
Prestolite	1.60-1.79
Essex	1.34-1.55
Secondary Resistance	
Prestolite	9400-11,700
Essex	9000-12,200
Single Ballast Resistor	
Resistor Resistance	1.12-1.38

OVERHAUL

DISTRIBUTOR

Disassembly – **1)** Remove distributor cap, then remove rotor by prying under upper part of rotor with 2 screwdrivers. Remove 2 screws attaching vacuum control unit to distributor housing. Disconnect vacuum control arm from upper plate and remove vacuum control unit.

2) Using 2 screwdrivers, pry reluctor off of shaft. Be careful not to damage or distort reluctor teeth. Remove 2 screws attaching lower plate to distributor housing and lift out lower plate, upper plate, and pick-up coils as an assembly.

3) If distributor shaft side play is more than .006", replace housing assembly or shaft and governor assembly. If gear is either worn or damaged, it must be replaced.

4) Scribe a line on the bottom of distributor shaft in a direct line with the original distributor drive gear retaining pin hole. Remove drive gear retaining pin and drive gear. Use a file to clean burrs from around pin hole in distributor shaft and remove lower thrust washer. Push distributor shaft up and remove it through top of distributor housing.

Reassembly – **1)** Test operation of governor weights and inspect the governor weight springs for distortion. Lubricate governor weights. Inspect all bearing surfaces and pivot pins for roughness, binding or looseness. Lubricate and install upper thrust washer on shaft and slide shaft into distributor housing.

2) Slide new drive gear onto shaft and position drive gear retaining pin hole 90° from original hole, using scribed line on distributor shaft as a guide. It will be necessary to drill a new hole in the distributor shaft.

3) Before drilling new hole, .124-.129" in diameter, be sure that clearance between drive gear and thrust washer is .007". Drill new hole and install new drive gear and drive gear retaining pin.

4) Install lower plate, upper plate, and dual pick-up coils as an assembly. Attach vacuum control arm to upper plate and install vacuum control unit and attaching screws.

5) Position reluctor keeper pin into place on reluctor sleeve and firmly press reluctor into place. Make sure keeper pin is in place. Lubricate felt pad in top of reluctor sleeve and install rotor and cap.