

Distributors & Ignition Systems

DELCO-REMY ELECTRONIC SPARK SELECTION IGNITION SYSTEM

Cadillac
Brougham
Commercial Chassis
DeVille
Eldorado
Limousine
Seville

DESCRIPTION

Electronic Spark Selection is used on all Non-Diesel Cadillac models, except Federal Seville and Eldorado models (with digital electronic fuel injection and 368" V8 engines). The ESS system is able to advance or retard the entire spark curve under certain operating conditions. This increases fuel economy and reduces emissions. System consists of an electronic decoder, modified HEI distributor, pick-up coil and timer core, and various engine sensors.

NOTE — For additional information on basic HEI system, see DELCO-REMY HIGH ENERGY IGNITION article in this section.

OPERATION

The pick-up coil provides engine speed and ignition timing information to the electronic decoder, which delays or does not delay shutting off current in the primary winding of the ignition coil. This functions as timing retard. Maximum delay of primary winding current shut-off occurs when the engine is cranking (and cold operation, California only). Delay is less during normal city driving, resulting in normal timing advance. The decoder further identifies engine operating conditions influencing timing, utilizing engine vacuum, coolant temperature and engine cranking.

NOTE — Electronic Spark Selection distributors have 5-pin electronic control modules, compared to 7-pin modules used on vehicles with digital electronic fuel injection.

TESTING

NOTE — The special 5 pin ignition module can only be tested using an analyzer (J-24642 or equivalent). When performing a compression test, make sure ESS system and HEI distributor is disconnected.

BY-PASSING DECODER

This is a quick check for suspected ESS decoder problems on an engine that will not start.

1) Disconnect four wire plug in the distributor harness, located between the distributor and the ESS decoder. Use a jumper wire to connect the green wire pin (number 2) and the black wire pin (number 4) on the distributor side of the plug.

2) This by-passes the ESS decoder and allows the engine to run with just the HEI distributor. Connect timing light to engine. Start engine and observe timing. Timing should be 6° higher than normal engine timing. This is because when decoder is by-passed, the engine retard is also by-passed.

3) If engine starts, replace decoder and check that engine operates properly. If engine fails to start, proceed with testing.

PRIMARY TESTING (EXC. MODULE & DECODER)

1) Check for correct voltage at the battery terminal connector. Voltage should equal battery voltage in "RUN" and "START" positions. Ensure terminal connector is positioned correctly.

2) To test ignition coil, remove distributor cap and wires as an assembly. Connect one ohmmeter lead to the tach terminal and the other lead to the battery terminal at distributor connector.

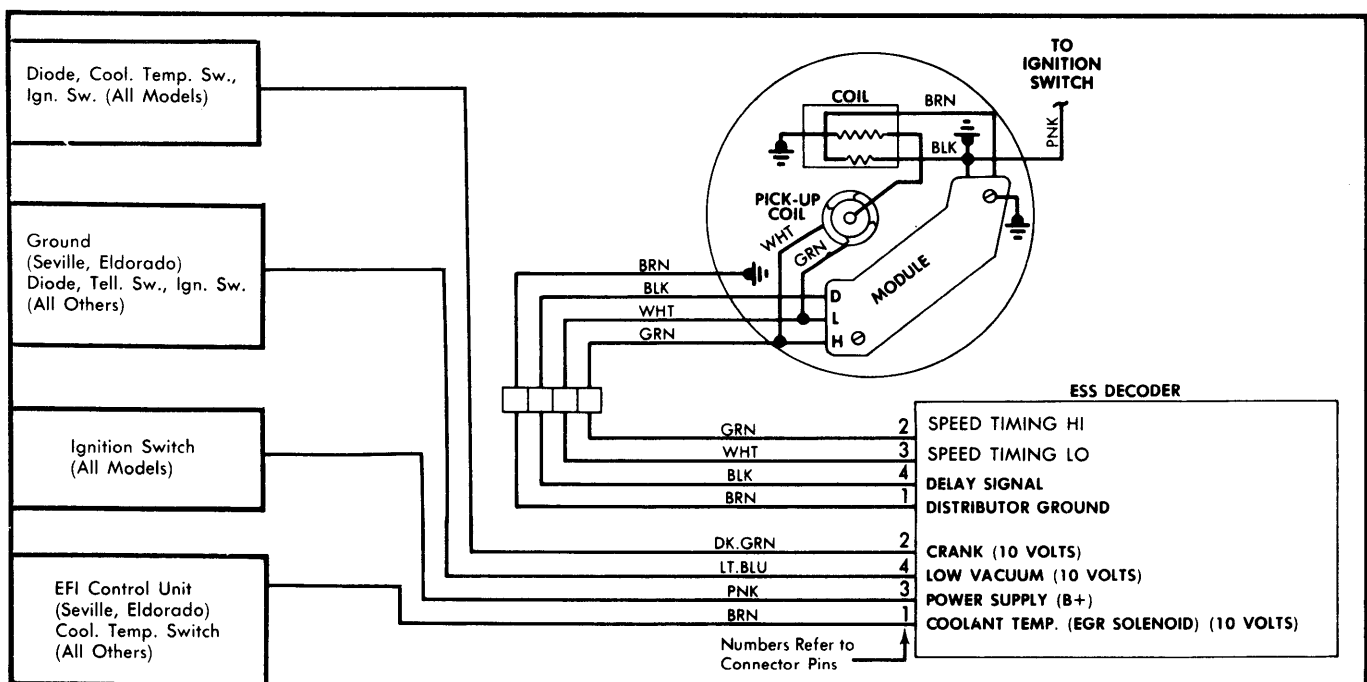


Fig. 1 Schematic for Electronic Spark Selection Ignition System (All Models)

DELCO-REMY ELECTRONIC SPARK SELECTION IGNITION SYSTEM (Cont.)

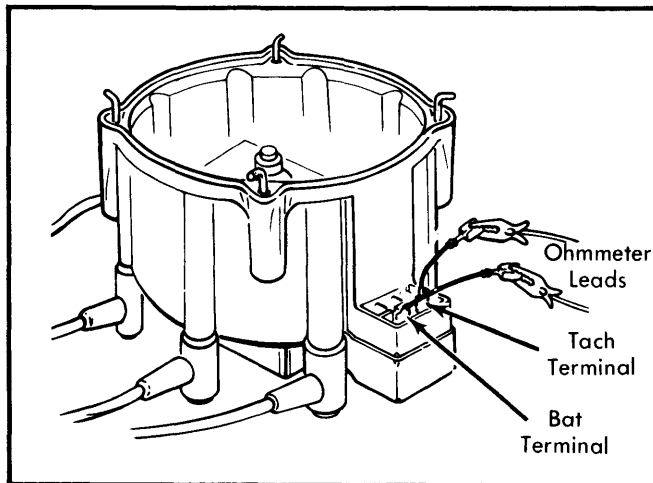


Fig. 2 Connections for Coil Primary Resistance Test

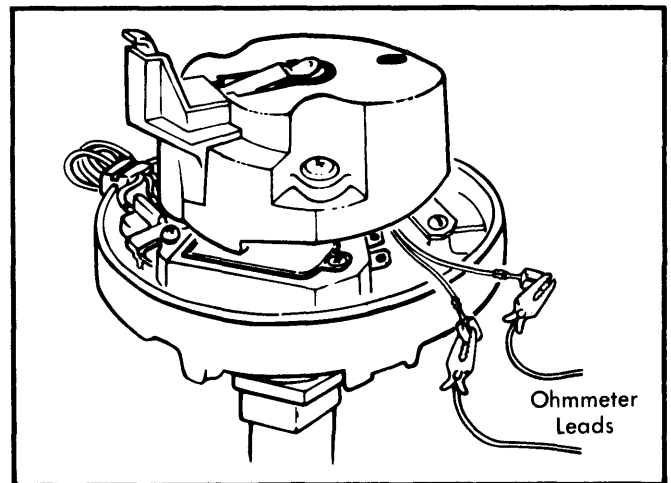


Fig. 4 Connection for Pick-Up Coil Assembly Resistance Test

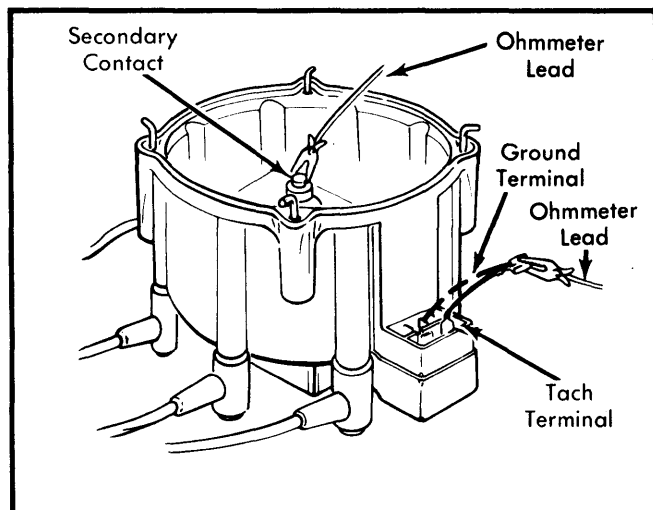


Fig. 3 Connections for Coil Secondary Resistance Test

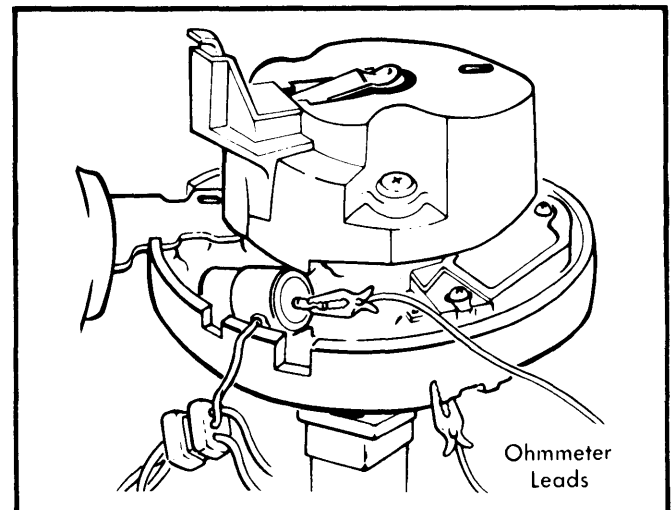


Fig. 5 View Showing RFI Test Connections

3) Reading should be 0.4 to 1.0 ohms. Remove lead from battery terminal and connect to the ground terminal. Reading should be infinity. If either reading is not correct, replace coil.

4) Connect one ohmmeter lead to tach terminal and the other lead to the coil secondary contact. Reading should be infinity, if not replace coil.

5) Disconnect ohmmeter lead from tach terminal and connect it to the ground terminal. Reading should be 6000 to 30000 ohms. If not, replace coil.

6) To test pick-up coil assembly resistance, disconnect pick-up coil leads from control module. Connect ohmmeter leads to pick-up coil leads. Reading should be 500-1500 ohms. If not, replace pick-up coil assembly.

7) To check pick-up coil assembly for grounding, remove either ohmmeter lead from previous test and connect it to a good

ground. Reading should be infinity. If not, replace pick-up coil assembly.

8) Disconnect the RFI capacitor. Put one ohmmeter lead on the capacitor terminal and the other lead to ground. The meter should move slightly and return to infinity. Any continuous reading other than infinity, replace the RFI capacitor.

9) If the system is still inoperable or functioning improperly, and all electrical connections and wiring have been checked, proceed with the module tests. If special tester J-24642 is not available, test by substitution.

PRIMARY TESTING (MODULE)

NOTE — HEI tester (J-24642) must be a modified tester or incorrect readings will be obtained. Modified testers have a black metal face plate.

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DELCO-REMY ELECTRONIC SPARK SELECTION IGNITION SYSTEM (Cont.)

Test No. 1 – 1) Disconnect three way connector from distributor cap. Connect tester adapter to connector (distributor side). Connect tester's 3-way connector to adapter. Connect tester battery clips to battery (red wire to positive and black wire to negative).

NOTE – Do Not connect module ground clip to ground.

2) Crank engine and hold tester toggle switch in the 4 & 5 terminal position. Engine cranking speeds must be greater than 100 RPM for valid test results.

3) A momentary indication of the red "Fail" light followed by a steady indication of the green "Pass" light indicates that both the HEI module and the pick-up coil are functioning properly. A steady red "Fail" light indicates that the module or the pick-up coil are defective. If the "Fail" light stays on, proceed to test number 2.

Test No. 2 – 1) Remove the HEI module from the distributor. Connect the modified J-24642 tester to a 12 volt battery (red wire to positive and black wire to negative).

2) Connect the black 2-wire connector of tester to the "B" and "C" terminals of the module. Connect the yellow 2-wire connector to the "L" and "H" terminals of the module. Connect the module ground clip of tester to the module ground terminal.

3) Hold tester toggle switch in the 5 terminal position. The red "Fail" light should come on momentarily followed by a steady indication of the green "Pass" light. If module performed as described, proceed with next step. If the red "Fail" light remained on, replace module.

4) Ground the "R" terminal of the module to the tester module ground terminal with a jumper wire. Do not remove the ground clip from the module tester that was connected earlier.

5) Hold tester toggle switch in the 5 terminal position. A momentary red "Fail" light followed by a steady green "Pass" light should be indicated. If a continuous red "Fail" light appears, replace module. If module checked out good, check pick-up coil and timer core for damage or broken wires. Repair or replace as necessary.

TESTING ELECTRONIC DECODER

1) Check decoder voltage, with ignition switch on, at pin 3 (pink wire) of decoder 4-wire connector. Voltage should be within 2 volts of battery voltage.

2) With engine at normal operating temperature, disconnect and plug vacuum hoses at distributor and parking brake. Check engine timing against emission label in engine compartment. Adjust if necessary.

3) Disconnect 3-wire connector from EGR solenoid to decoder (this connector contains the brown wire from decoder). Do not disconnect EGR solenoid 2-wire connector from manifold harness.

4) Spark should retard from timing observed in step 2). If not, check for open in brown wire. If no open found, replace decoder.

5) Reconnect EGR solenoid 3-wire connector. Increase engine speed to 1800 RPM, check and record timing. Disconnect vacuum hose at fuel economy switch. Timing should retard from recorded timing.

6) If timing did not retard, check fuel economy switch and wires for an open circuit. If no open found, replace decoder.

NOTE – For further information on diagnosing or testing this system, see DELCO-REMY HIGH ENERGY IGNITION (HEI) SYSTEM and GENERAL MOTORS IGNITION SYSTEMS WITH C-4 EMISSIONS in this section.