

Distributors & Ignition Systems

GENERAL MOTORS ELECTRONIC SPARK CONTROL & ELECTRONIC MODULE RETARD IGNITION SYSTEM

Buick
Oldsmobile
Pontiac

DESCRIPTION

The Electronic Spark Control (ESC) system and the Electronic Module Retard (EMR) system perform the same function, retarding ignition timing. The difference between the two systems is when the timing is retarded. The ESC system, which is used on engines equipped with the C4 emission system, retards timing whenever engine detonation is detected by a detonation sensor. The ESC system retards ignition timing a variable amount. The amount is a function of engine detonation. The EMR system retards ignition timing a fixed amount when the engine coolant temperature is within a predetermined specification.

OPERATION

The ESC system uses a detonation sensor to automatically retard ignition timing during periods of engine operation when detonation occurs. The intake manifold transmits vibrations caused by detonation. The sensor detects the presence and intensity of detonation and feeds this information to the ESC controller. The controller evaluates the sensor signal and sends a command signal to the distributor to adjust timing. The HEI distributor has a modified electronic module which responds to signals from the controller. The ESC can send signals to the distributor to retard ignition timing up to 13-17° to minimize detonation.

The EMR system retards ignition timing 10° under certain conditions. On Federal Oldsmobile vehicles with the following engines, 260" VIN F, 307" VIN Y and 350" VIN R, ignition timing is retarded 10° when engine temperature is below 120°F.

This system is controlled by the EMR vacuum switch. On vehicles with the C4 emission system, ignition timing is retarded 10° when engine coolant is between 66°F and 130°F, throttle opening is below 45° and engine speed is above 400 RPM. At all other times the EMR module operates like a standard HEI module.

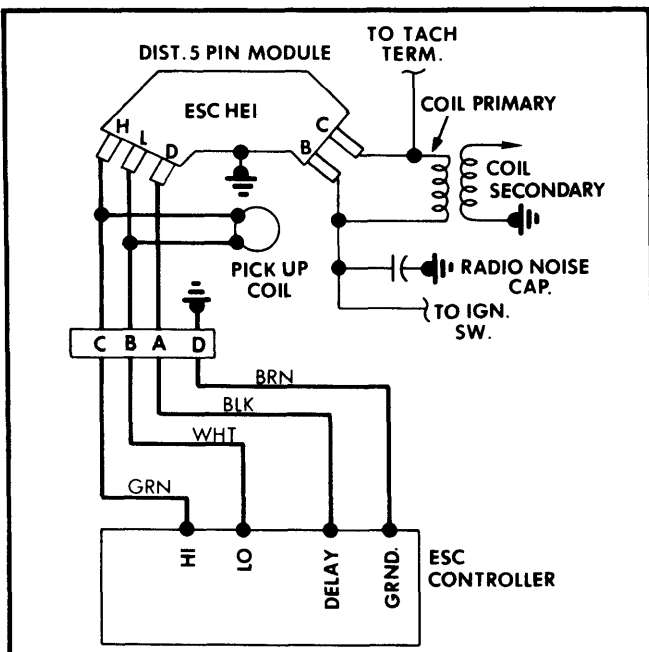


Fig. 1 General Motors Electronic Spark Control Wiring Schematic (Without Turbocharger)

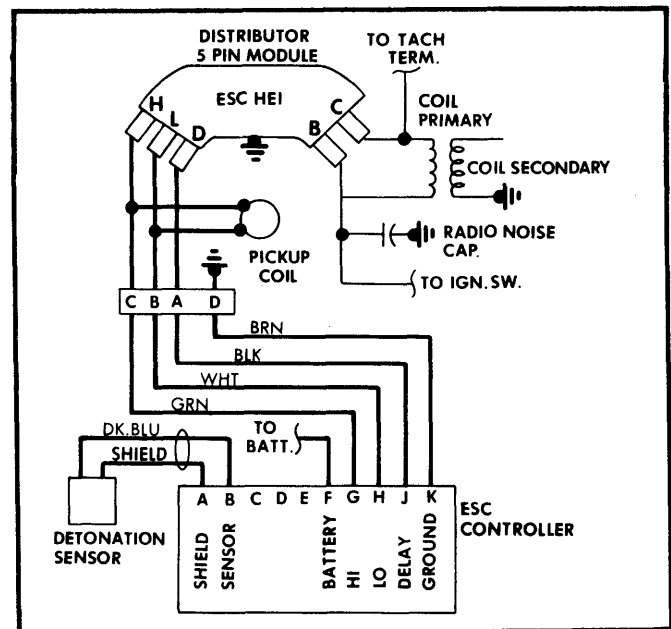


Fig. 2 General Motors Electronic Spark Control Wiring Schematic (With Turbocharger)

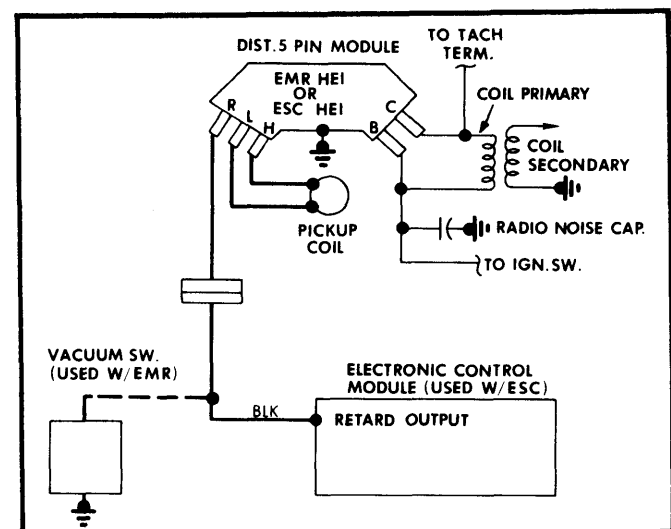


Fig. 3 General Motors Electronic Module Retard Wiring Schematic

TESTING

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.

GENERAL MOTORS ELECTRONIC SPARK CONTROL & ELECTRONIC MODULE RETARD IGNITION SYSTEM (Cont.)

ELECTRONIC MODULE RETARD

Without C4 System – 1) With engine idling and engine coolant temperature above 120°F, check engine timing. Disconnect EMR lead at EMR vacuum switch.

NOTE – If engine vacuum drops below 4 in. Hg, the EMR switch opens to allow normal ignition timing.

2) If timing advances, check EMR vacuum switch. If no vacuum is present, replace EMR switch. If vacuum is present, check vacuum hose connections at 6 port TVS switch. If OK, replace TVS switch.

3) If timing does not advance, ground EMR lead. If timing retards, proceed to step 4). If timing does not change, check for an open circuit in EMR lead into distributor or connection at EMR module. If circuit is OK, replace EMR module and reset ignition timing.

4) If timing retards 10° when EMR lead is grounded, the EMR module is OK. Connect EMR lead to EMR vacuum switch. Apply vacuum to EMR vacuum switch. Timing should retard 10° when vacuum is 4 in. Hg or more.

5) With vacuum applied, and timing retards, EMR vacuum switch is OK. If timing does not retard, replace EMR vacuum switch.

With C4 System – 1) Start engine and idle until normal operating temperature is reached. Check ignition timing then disconnect EMR lead at distributor.

2) If timing does not change, proceed to step 4). If timing advances, connect a test light from battery positive terminal to EMR lead going to Electronic Control Module (ECM).

3) If test light does not come on, replace ECM. If test light does come on, disconnect connector from ECM. If test light goes out, replace ECM. If light stays on, repair ground lead in EMR.

4) If timing did not change when EMR lead was disconnected, ground distributor side of EMR lead. If timing now retards the trouble is not in the EMR circuit.

5) If timing does not change, check for open or grounded EMR lead to distributor. If lead is OK, replace EMR module.

ELECTRONIC SPARK CONTROL

Engine Detonation – 1) Check engine coolant for proper level and concentration. Be sure detonation sensor connector is properly installed. Check initial timing against emissions label. Reconnect vacuum advance hose after timing check.

2) If problems still exist, check ESC system by operating engine until warm. Turn air conditioner off and install tachometer. Set throttle fast idle cam on high step of cam. Engine RPM must be above 1800 RPM.

3) Using a steel rod, tap front of intake manifold rapidly with medium-to-heavy taps. Observe engine speed drop of 200 or more RPM. Original RPM should be restored within 20 seconds after tapping stops.

4) If RPM does not drop as noted, proceed to step 5). If RPM drops as noted, disconnect 4-wire connector to distributor. Insert jumper wire on distributor side of connector, between terminals "A" and "C". If engine does not run, check distributor as described under instructions for HEI in this section. If distributor checks OK, reconnect distributor to ESC controller. Check carburetor, turbocharger, or other systems.

5) If RPM did not drop and return to normal in 20 seconds, check detonation sensor for physical damage, improper installation or wrong torque.

6) Disconnect detonation sensor connector at cowl. On sensor side of harness, connect positive lead of an ohmmeter to connector terminal attached to center conductor of sensor. Connect negative ohmmeter lead to ground. Reading should be 175-375 ohms. If not, replace sensor.

7) If reading is within specifications, remove sensor and substitute a known good sensor to connector. With engine running at 1800 RPM, hold sensor in hand and tap lightly on threaded end. Check for a 200 RPM or more drop. If correct, install new detonation sensor.

8) If RPM did not drop in step 7) remove 10-pin connector at ESC controller. Install a jumper wire between terminals "A" and "B" of controller. Disconnect cowl sensor connector. Check continuity of sensor wire at cowl sensor connector.

9) If there was no continuity, repair detonation sensor wire. If continuity exists, replace sensor and sensor harness between cowl and sensor. If trouble still exists, replace ESC controller.

Poor Engine Performance – 1) Check engine coolant level and concentration. Check all vacuum hose connections and routings. Check initial timing against emissions label specifications. Reconnect vacuum advance hose. Check routing of detonation sensor wire. It must not be routed next to distributor or spark plug wires.

2) With engine running, check voltage between pins "F" and "K" of 10 pin connector at ESC controller. If voltage reads at or above 11.6 volts, proceed to step 3). If voltage is below 11.6 volts, check alternator charging circuit.

3) Turn air conditioner off, install tachometer and start engine, running it at 1800 RPM. Using a steel rod, tap front area of manifold rapidly using medium-to-heavy taps. Engine speed should drop 200 or more RPM and then return to original speed within 20 seconds after tapping stops.

4) If not, replace ESC controller. If RPM drops, disconnect 4-wire connector at distributor. Install jumper wire on distributor side of connector from terminal "A" to "C". If engine will not run, check distributor according to instructions for HEI in this section. If distributor is OK, reconnect ESC controller and check other systems than ignition. If distributor is defective, repair as necessary and reconnect ESC controller.

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GENERAL MOTORS ELECTRONIC SPARK CONTROL & ELECTRONIC MODULE RETARD IGNITION SYSTEM (Cont.)

Engine Cranks But Does Not Start – 1) Using a modified spark plug (side electrode removed and case grounded), check for spark at No. 2 spark plug. If spark occurs, ESC is OK. Check other systems. If no spark occurs, check ESC controller 10 pin connector and 4-wire connector from controller to distributor.

2) If connections are good, check voltage from pin "K" to pin "F" at 10 pin connector. If under 7.0 volts, check for open circuit between pin "F" and ignition switch. If 7.0 volts or more, disconnect 4-wire connector at distributor. Disconnect 10 pin ESC controller connector.

3) Check for continuity of harness wires at pins "G", "H", "J", and "K". If no continuity from end-to-end, repair bad wires. If

continuity exists, install a jumper wire on distributor side of 4-wire connector, between pins "A" and "C". Start engine and run at idle speed only.

4) If engine does not run, proceed to step 5). If engine runs, replace ESC controller. If problem still exists, reinstall jumper wire between terminals "A" and "C". If engine does not run, check distributor according to HEI instructions in this section. Repair as necessary and reconnect ESC controller.

5) If engine would not run in step 3), check distributor according to HEI instructions in this section. Reconnect jumper wire between terminals "A" and "C" after distributor is repaired (if necessary). If problem still persists, replace ESC controller.