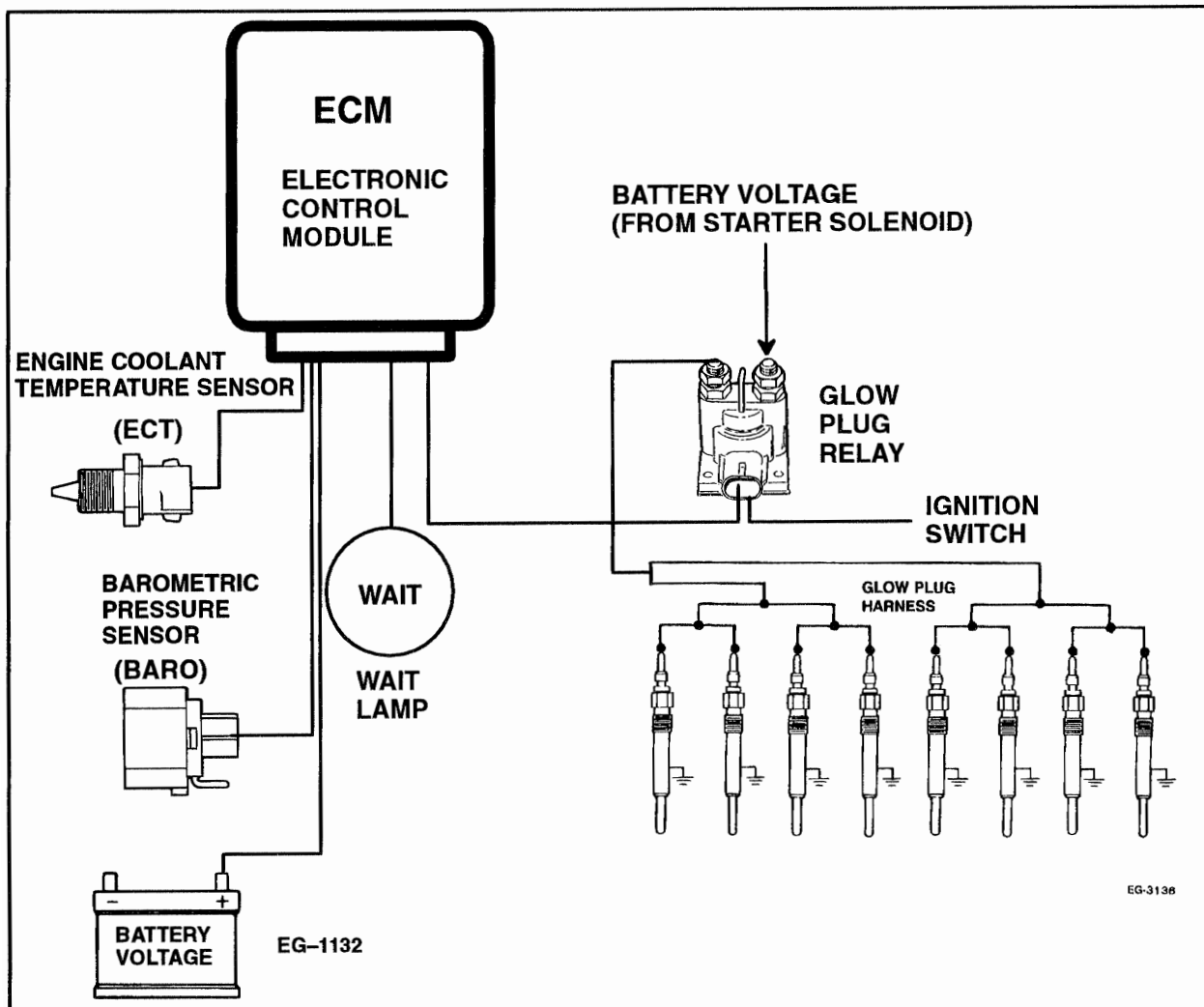


ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

GLOW PLUG CONTROLLER (GPC)

GLOW PLUG CONTROL



OUTPUT FUNCTIONS

Glow Plug Relay – Controls the current flow to the glow plugs. Glow plug relay "ON" time is controlled by the ECM and is a function of engine coolant temperature, barometric pressure and battery voltage. "ON" time normally varies between 10 to 120 seconds. The glow plugs are self limiting glow plugs and do not require to be cycled on and off. (The glow plug relay will only cycle on and off repeatedly when there is a system voltage condition greater than 13.0 volts.)

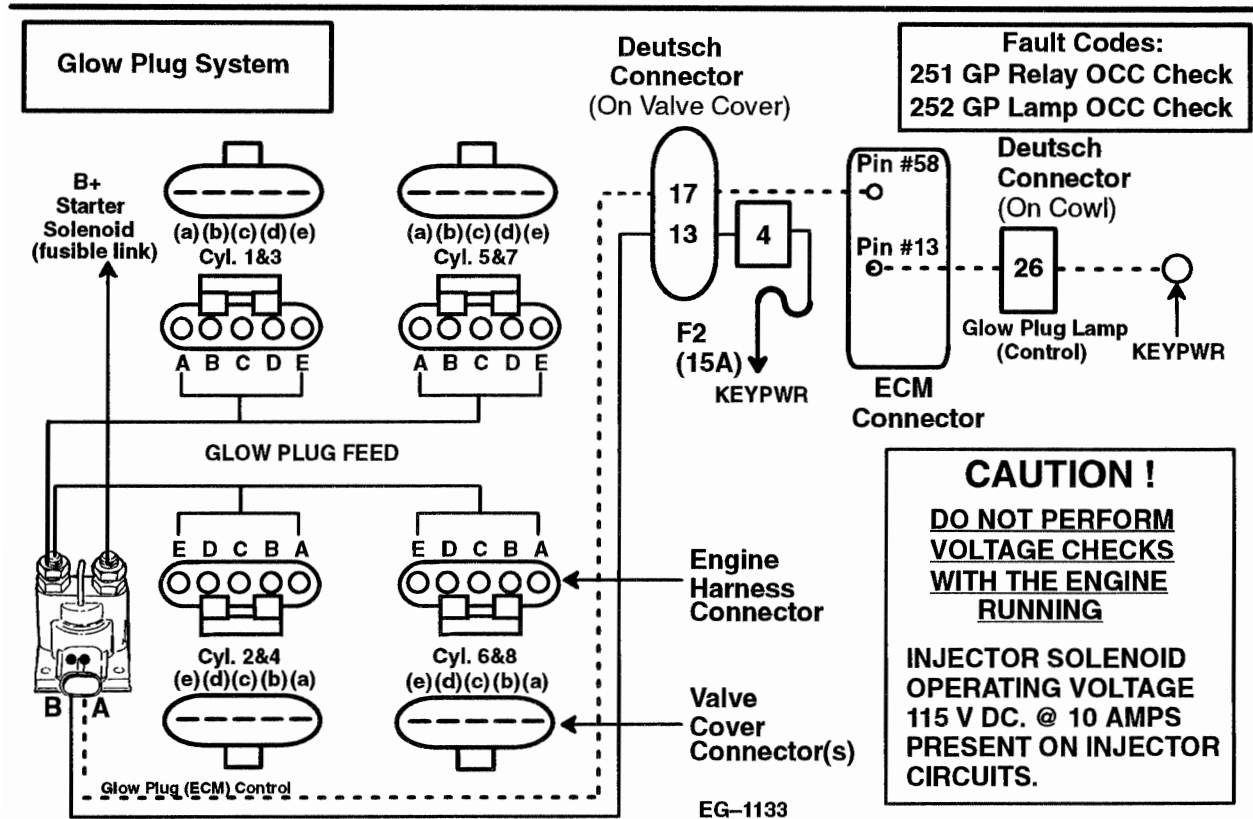
Glow Plug Wait Lamp – Lamp that indicates to the operator when the glow plugs have been on long enough to crank the engine. It is controlled by the

ECM. Wait light on time is a function of engine coolant temperature, barometric pressure and battery voltage. "ON" time normally varies between 2 to 10 seconds. (**NOTE: Wait light on time is independent from glow plug relay on time.**)

FAULT DETECTION/MANAGEMENT

An open or shorted to ground glow plug relay or wait lamp circuit can be detected by an on demand output circuit check performed during the engine off tests.

Glow plug and glow plug harness problems can not be detected by the ECM.

**Glow Plug Relay Operation (Voltage Checks)**

Test Points	Spec.	Comments
B+ terminal to ground	B+	Relay switch power, B+ should be present at all times (terminal with single 6 gauge wire). Check connection at starter or fusible links if no power (voltage) present.
Glow Plug Feed to Grd.	B+	Glow plug feed voltage should be present 10 to 120 sec. after key is cycled on, dependent upon battery voltage, barometric pressure (altitude) and engine coolant temperature.
B to Ground	B+	Relay coil power. Voltage should be present when ign. key is ON – Check fuse if no voltage.
Pin # 58 to Ground	0v / 12v	Glow plug control, switched to (grd) by ECM during operation. 0v = relay ON, 12v = relay off.

Glow Plug and Harness Operation

(Measure glow plug resistance to ground with the pigtail connector installed at the valve cover connector: then measure resistance from the glow plug feed stud to the harness connector.)

Test Points			Comments
Glow Plug Number	Pigtail Connector to Ground (B-)	Relay to Harness Connector	
Spec	< .1 to 6 Ohm	< 6 Ohms	Relay to Harness Connector NOTE: ALL ENGINE HARNESS CONNECTORS FOR GLOW PLUG/INJECTORS SHOULD BE DISCONNECTED BEFORE TAKING MEASUREMENTS High resistance could indicate an open circuit in the engine harness between the glow plug connector and the relay.
#1			
#3			
#5			
#7			
#2			Pigtail Connector to Ground B- High resistance could indicate an open circuit in the UVC (under the valve cover) harness or in the glow plug. Glow plug resistance should measure .1 to 6 ohms dependent upon engine temperature.
#4			
#6			
#8			

Fault Code Descriptions

251 = OCC CHK performed by ECM during engine off test. Indicates high or low resistance in GP coil circuit.
 252 = OCC CHK performed by ECM during engine off test. Indicates high or low resistance in GP lamp circuit.

ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

GLOW PLUG CONTROLLER (GPC)

GLOW PLUG SYSTEM EXTENDED SYSTEM DESCRIPTION

FUNCTION

The Navistar engine control system includes a Glow Plug Control System that controls the current flow to the glow plugs. Glow plug relay "ON" time is controlled by the ECM and is a function of Engine Coolant Temperature, Barometric Pressure, and Battery Voltage. Glow plug "ON" time varies between 10–120 seconds. Glow plugs are self limiting glow plugs and do not require to be cycled on and off. The glow plug relay will cycle on and off repeatedly, if battery voltage is greater than 13.0 volts.

OPERATION

Refer to circuit diagram on page 135 for the following discussion.

Glow Plug System operation is dependent upon engine coolant temperature, barometric pressure and battery voltage. When the ignition switch is placed in the "ON" position, Terminal B (coil side) of the glow plug relay is supplied with battery voltage. Terminal A (coil side) of the relay is connected to Terminal 58 of the ECM. The ECM supplies battery ground to the glow plug relay coil via an internal driver transistor when coolant temperature, barometric pressure and battery voltage conditions require the glow plug system to warm the engine for starting.

Applying ground (B–) to terminal A causes the relay to switch and apply battery voltage (present at the large terminal containing a single wire leading to and connected to the B+ terminal of the starter solenoid) to the other large terminal which contains two wires. These wires now supply battery power to the glow plugs in the right and left cylinder heads.

The Glow Plug Wait Lamp is also turned on by the ECM when the glow plug relay is enabled.

(NOTE: WAIT LIGHT ON TIME IS INDEPENDENT FROM GLOW PLUG RELAY ON TIME).

ECM DIAGNOSTICS

The ECM does not continuously monitor the glow plug control circuitry. An open or shorted to ground glow plug control relay on the control side (coil) circuit can be detected by an on demand output circuit check performed during the engine off test.

Fault codes can be retrieved using the electronic service tool or the STI Self Test Input Diagnostic Switch located on the vehicle dashboard. If the ignition key is shutoff, the code will be stored as an active code.

FLASH CODE 251 ATA CODE SID 38 FMI 11 GPC: OCC SELF TEST FAILED

Code 251 is set only during the Engine Off Standard Output Circuit check. This indicates that the ECM has performed an output circuit test, measured the voltage drop across the glow plug relay circuit and determined it is above or below specification. If the fault is present, the glow plug relay is not operating and the glow plugs are not enabled.

Possible Causes: Open feed circuit, open glow plug relay coil, an open or shorted GPC signal circuit.

FLASH CODE 252 ATA CODE SID 36 FMI 11 GLOW PLUG LAMP: OCC SELF TEST FAILED

Code 252 is set only during the Engine Off Standard Output Circuit check. This indicates that the ECM has performed an output circuit test, measured the voltage drop across the glow plug Wait Lamp circuit and determined it is above or below specification.

Possible Causes: Glow plug Wait Lamp burned out, open or shorted glow plug Wait Lamp circuit.