

S: Glow Plug System

← [S: Introduction](#)

S1 DTC P1391, P1395 — RIGHT BANK AND P1393, P1396 — LEFT BANK

Note: For running KOER glow plug monitoring self test, refer to [Section 2C](#) .

- One of the above codes will set when glow plugs are commanded on for over 35 seconds and battery voltage is between 11.8v and 14v, with at least one glow plug not being powered.
- Key off.
- Measure voltage between large wire terminal Circuit 38 (BK/O) on glow plug relay and battery ground.

Is battery voltage present?

Yes	No
GO to S2 .	SERVICE open in Circuit 38 (BK/O) or fusible links.

S2 CHECK FOR DTC P0380

- NGS installed.
- Perform KOEO On-Demand Self Test and Retrieve/Clear Continuous DTCs.

Is DTC P0380 present?

Yes	No
GO to S3 .	GO to S8 .

S3 DTC P0380

- DTC P0380 is set when the PCM detects a malfunction in the glow plug relay control circuit.
- Possible causes:
 - shorted to power
 - open/grounded circuit
 - open fuse (F-Series — Fuse 22, Econoline — Fuse U)
 - worn or damaged glow plug relay
- Key on, engine off.
- Measure voltage at glow plug relay point B, Circuit 16 (R/LG) and battery ground. Refer to the schematic for location of circuits.

Is voltage present?

Yes	No
GO to S4 .	SERVICE open in ignition power Circuit 16 (R/LG). If fuse is blown, CHECK for short to ground.

S4 RELAY COIL RESISTANCE TEST

- Key off.
- Disconnect the wire going to the glow plug relay, Circuit 1086 (P/O) point A.
- Measure resistance through relay coil, between point A and Point B.

Is the resistance between 1 ohm and 8 ohms?

Yes	No
GO to S5 .	REPLACE glow plug relay.

S5 CHECK SHORT TO POWER

- Key off.
- Install breakout box. Leave PCM disconnected.
- Control circuit still disconnected from the relay.
- Key on, engine off.
- Measure voltage between test Pin 101 and battery ground.

Is voltage present?

Yes	No
SERVICE short to power. CLEAR DTC and RETEST.	GO to S6 .

S6 CHECK SHORT TO GROUND

- Key off.
- Breakout box installed. Leave PCM disconnected.
- Measure resistance between disconnected wire going to glow plug relay and battery ground.

Is resistance greater than 10,000 ohms?

Yes	No
GO to S7 .	SERVICE short to ground. CLEAR DTC and RETEST.

S7 CHECK CIRCUIT FOR OPEN

- Key off.
- Breakout box installed. Leave PCM disconnected.
- Measure resistance between test Pin 101 and Circuit 1086 (P/O) eyelet going to glow plug relay.

Is resistance less than 5 ohms?

Yes	No
REPLACE PCM.	SERVICE open in Circuit 1086 (P/O).

S8 CHECK GLOW PLUG RELAY

- The glow plug ON time is dependent on oil temperature and altitude. The glow plugs come on between 1 to 120 seconds depending on oil temperature and do not come on at all if EOT is above 55°C (131° F). Verify glow plug

control ON time by using NGS PID GPCTM.

- EOT temperature below 49°C (120°F).
- Key on, engine off.
- Measure voltage between center terminal of glow plug shunt and battery ground.

Is voltage present for at least 30 seconds?

Yes	No
GO to S9 .	REPLACE glow plug relay.

S9 CHECK GLOW PLUG

- Key off.
- On the bank with the code, disconnect both connectors on the valve cover gasket.
- Inspect both harness connector and gasket for a loose fit. If damaged, repair or replace.
- Install Rotunda Glow Plug Injector Adapter 014-00935 or equivalent to the valve cover gasket.
- Measure resistance between each of the four glow plug circuits on Rotunda Adapter and engine ground (clean off a spot on the high-pressure oil reservoir to ensure a good ground).

Is resistance less than 2 ohms?

Yes	No
For DTCs P1391 and P1395, GO to S11 . For DTCs P1393 and P1396, GO to S12 .	GO to S10 .

S10 CHECK UNDER VALVE COVER

- Key off.
- Remove valve cover and verify that the connections to the glow plugs are OK.
- If OK, disconnect the suspect glow plug connector.
- Measure resistance between the glow plug and engine ground.

Is resistance less than 2 ohms?

Yes	No
REPLACE valve cover gasket or UVC harness.	REPLACE glow plug. CLEAR DTCs and RETEST.

S11 CHECK GLOW PLUG MONITORING CIRCUIT — DTCS P1391, P1395

- Key off.
- Disconnect all four valve cover connectors on both right and left banks.
- Inspect both harness connector and gasket for a loose fit. If damaged, repair or replace.
- Disconnect PCM.
- Install breakout box. Leave PCM disconnected.
- Measure resistance between all four glow plug circuits on the right bank and test Pin 9 on the breakout box.

Are all readings within 2 ohms of each other?

Yes	No

GO to [S13](#) .

SERVICE open between valve cover connector and PCM connector. VERIFY glow plug shunt nuts are clean and tight.

S12 CHECK GLOW PLUG MONITORING CIRCUIT — DTCs P1393, P1396

- Key off.
- Disconnect all four valve cover connectors on both right and left banks.
- Inspect both harness connector and gasket for a loose fit. If damaged, repair or replace.
- Disconnect PCM.
- Install breakout box. Leave PCM disconnected.
- Measure resistance between all four glow plug circuits on the left bank and test Pin 34 on the breakout box.

Are all readings equal and less than 2 ohms?

Yes	No
GO to S13 .	SERVICE open between valve cover connector and PCM connector. VERIFY glow plug shunt nuts are clean and tight.

S13 CHECK GLOW PLUG MONITORING CENTER CIRCUIT

- Key off.
- Breakout box installed. Leave PCM disconnected.
- Measure resistance between center terminal on glow plug shunt and test Pin 8 on the breakout box.

Is resistance less than 2 ohms?

Yes	No
GO to S14 .	SERVICE open in Circuit 339 (GY).

S14 COMPARE RIGHT BANK TO LEFT BANK

- Key off.
- Record all readings. The circuits must be within 2 ohms of each other.
- Measure resistance between all four glow plug circuits on left bank and test Pins 8, 9 and 34, then all four glow plug circuits on right bank and test Pins 8, 9 and 34.

Are all readings within 2 ohms of each other?

Yes	No
REPLACE PCM.	SERVICE open in the higher resistance circuit. VERIFY glow plug shunt nuts are clean and tight.

S15 DTC P1397 SYSTEM VOLTAGE OUT OF SELF TEST RANGE DURING KOER GLOW PLUG MONITOR SELF TEST

Note: DTC P1397 will set if system voltage is above 14 volts or below 11.8 volts at any time during KOER Glow Plug

Self Test. It may be necessary to raise rpm to maintain voltage. If unable to maintain system voltage, service as required according to service manual direction.

- Perform KOER Glow Plug Monitor Self Test. With a digital multimeter connected to the battery. Maintain system voltage until test is complete.

Does P1397 still set?

Yes	No
GO to Pinpoint Test A1 .	No concern located at this time.
