

AF: Glow Plug System

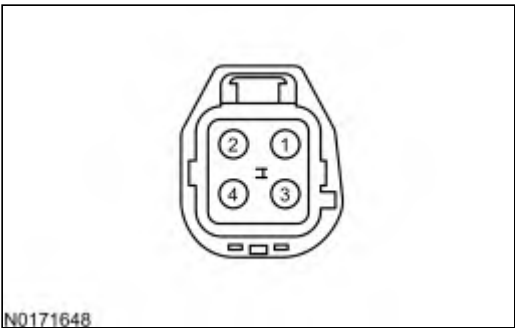
- Note:** The wait-to-start indicator ON time is independent from the glow plug control module (GPCM).
- Note:** Make sure the vehicle batteries are fully charged prior to carrying out the glow plug monitor self-test.
- Note:** Regeneration may occur during normal operation. During regeneration, diagnostic procedures may display biased values. If a regeneration occurs during diagnostic procedures, allow the process to complete before continuing diagnostics.

This pinpoint test is intended to diagnose the following:

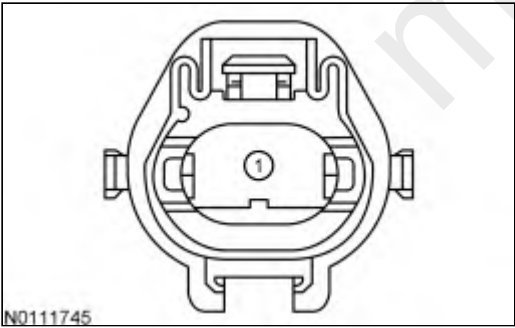
- harness circuits: glow plug, CAN2+, CAN2-, ISP-R, PWRGND, VBATT, and VPWR
- glow plugs (12A342)
- GPCM (12B533)

Glow Plug Control Module-A (GPCM-A) Connector

A

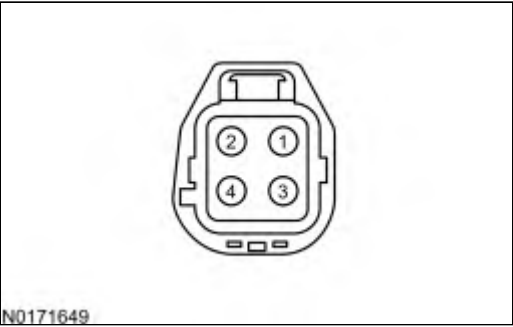


B



Vehicle	Connector	Pin	Circuit
Transit, Transit Connect	A	2	Glow Plug Number 4
		1	Glow Plug Number 3
		3	Glow Plug Number 2
		4	Glow Plug Number 1
All other vehicles	B	1	VBATT

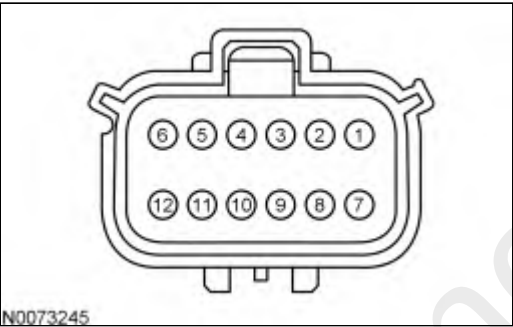
Glow Plug Control Module-B (GPCM-B) Connector



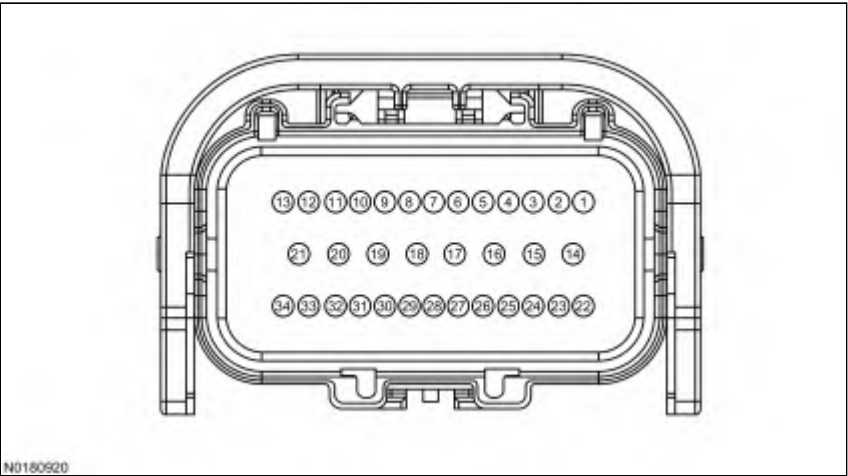
Pin	Circuit
2, 4	VBATT (Battery Voltage)

Glow Plug Control Module-B (GPCM-B) Connector

A



B

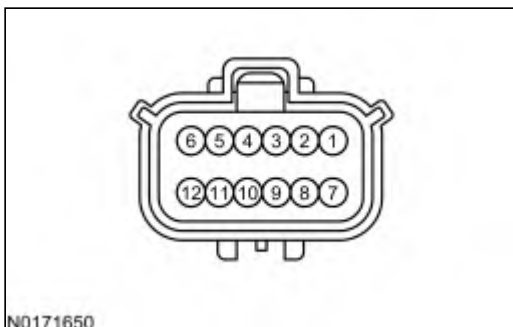


Vehicle	Connector	Pin	Circuit
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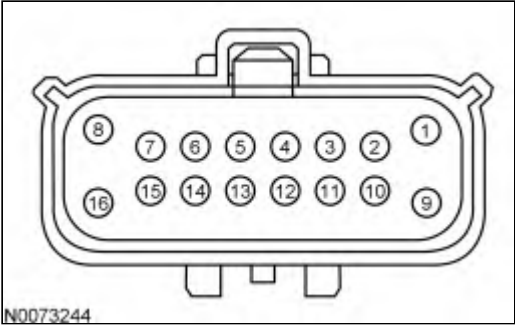
Vehicle	Connector	Pin	Circuit
F-150	A	8 7 6 5 2 1	Glow Plug Number 6 Glow Plug Number 5 Glow Plug Number 4 Glow Plug Number 3 Glow Plug Number 2 Glow Plug Number 1
F-Series Super Duty	B	9 8 27 7 29 34 31 30 25 13 11 10 6	CAN2- CAN2+ PWRGND ISP-R VPWR Glow Plug Number 8 Glow Plug Number 7 Glow Plug Number 6 Glow Plug Number 5 Glow Plug Number 4 Glow Plug Number 3 Glow Plug Number 2 Glow Plug Number 1
All other vehicles	A	12 11 8 7 6 5 2 1	Glow Plug Number 8 Glow Plug Number 7 Glow Plug Number 6 Glow Plug Number 5 Glow Plug Number 4 Glow Plug Number 3 Glow Plug Number 2 Glow Plug Number 1

Glow Plug Control Module-C (GPCM-C) Connector

A



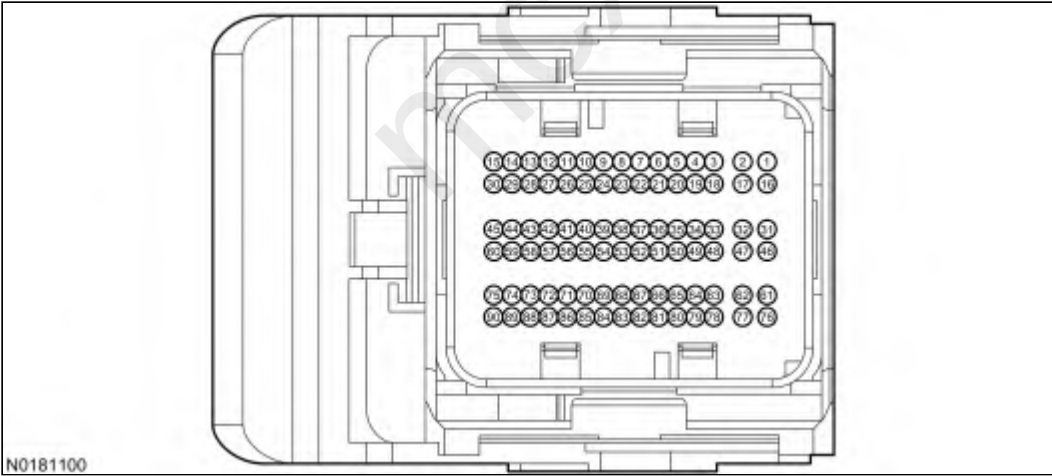
B



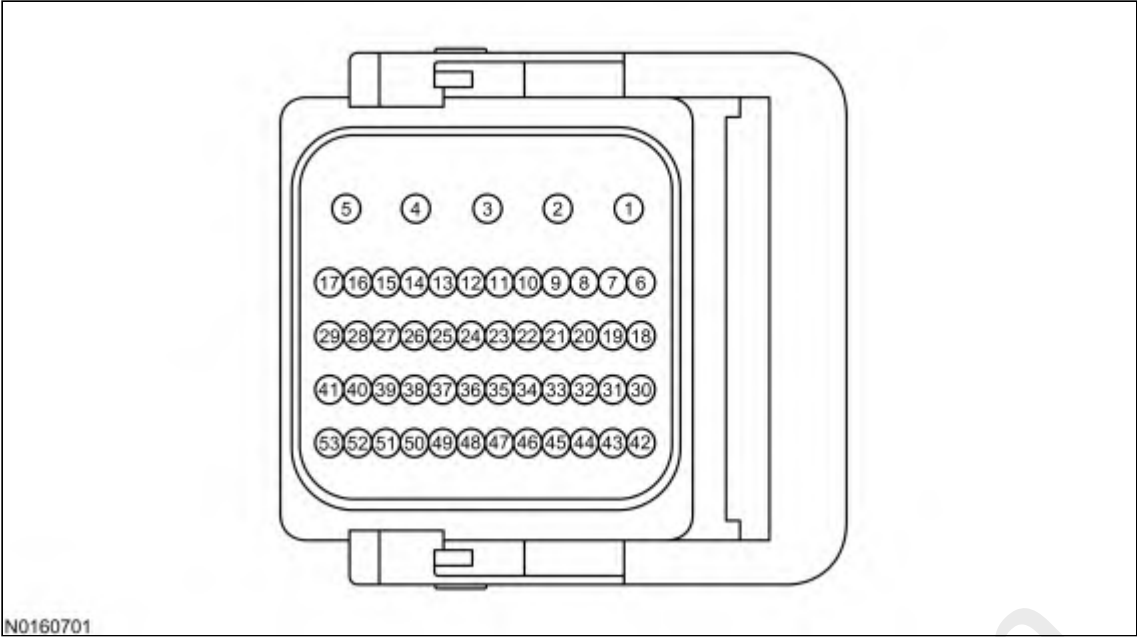
Vehicle	Connector	Pin	Circuit
Transit, Transit Connect	A	3 2 9 10 8	CAN2- CAN2+ PWRGND ISP-R VPWR
All other vehicles	B	4 3 5 6	CAN2- CAN2+ PWRGND VPWR

Powertrain Control Module-B (PCM-B) Connector

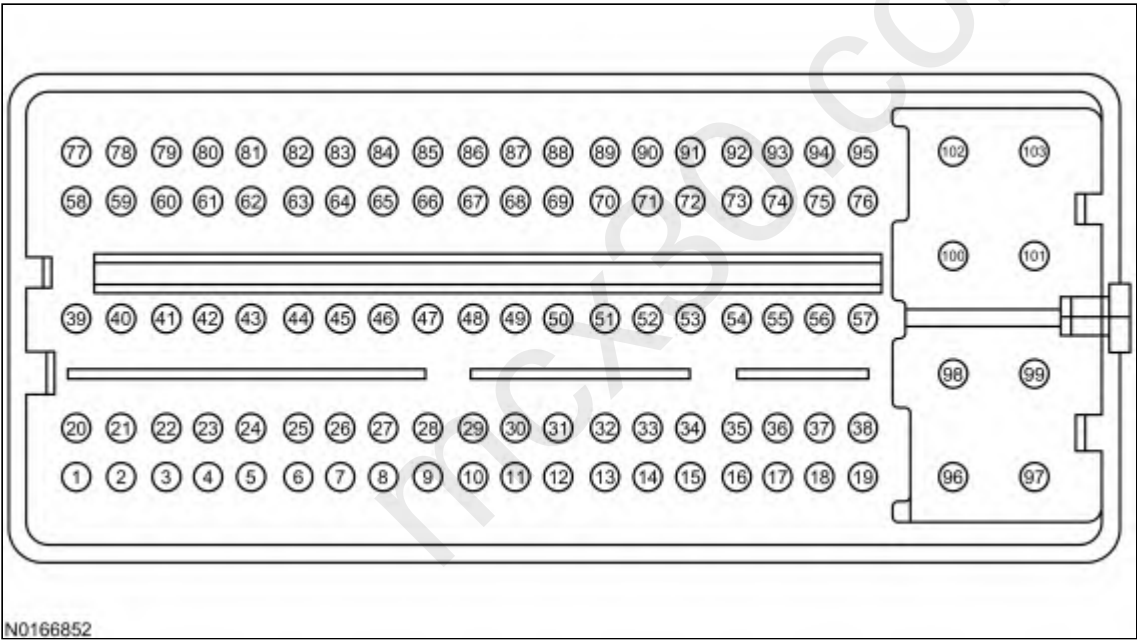
A



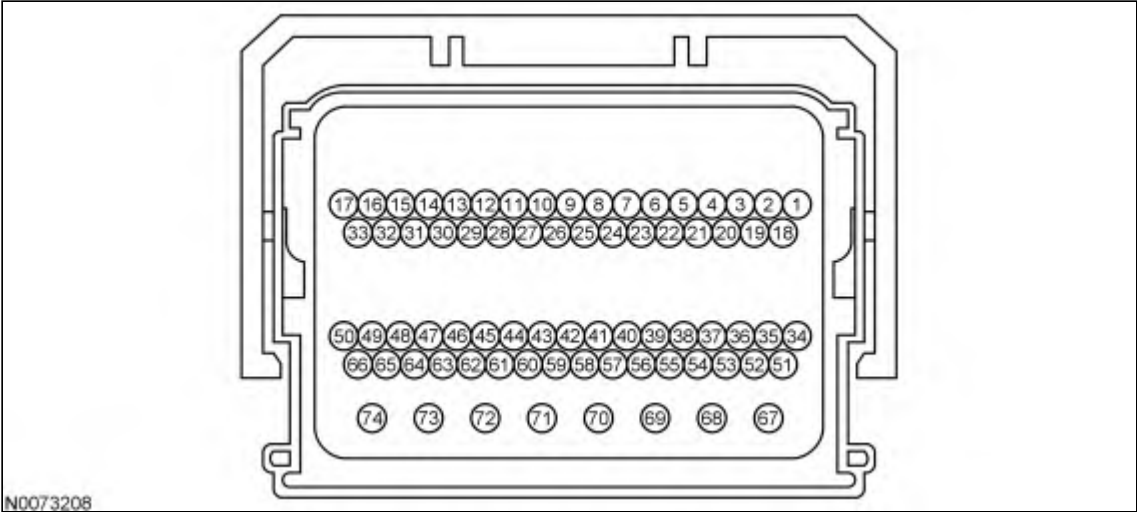
B



C

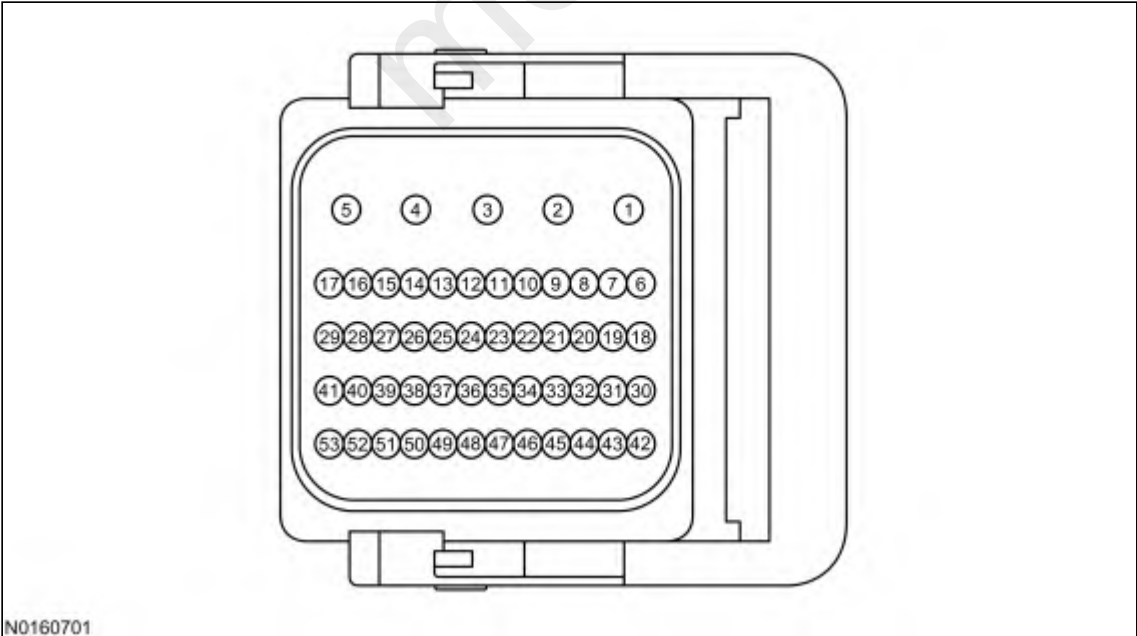


D



Vehicle	Connector	Pin	Circuit
F-Series Super Duty	A	15 14	CAN2- CAN2+
Transit	B	82 83	CAN2- CAN2+
Transit Connect	C	84 65	CAN2- CAN2+
All other vehicles	D	39 56	CAN2- CAN2+

Powertrain Control Module-T (PCM-T) Connector



Pin	Circuit
36	CAN2- (Controller Area Network 2)
35	CAN2+ (Controller Area Network 2)

AF1 PRELIMINARY DIAGNOSIS

- For F-150, F-Series Super Duty and Transit,
- Clear the PCM DTCs.
- Carry out the PCM self-test.
- For all others,
- Clear the PCM DTCs.
- Carry out the KOER Glow Plug Monitor self-test.

Are DTCs P0384, P052F, P064C, P066A, P066B, P066C, P066D, P066E, P066F, P0671, P0672, P0673, P0674, P0675, P0676, P0677, P0678, P067A, P067B, P067C, P067D, P067E, P067F, P068C, P068D, P068E, P068F, P06B9, P06BA, P06BB, P06BC, P06BD, P06BE, P06BF, P06C0, P06E5, P138B, P263C, P263E, U0074 or U0106 present?

Yes	For DTCs U0074 or U0106, GO to AF10 . For DTCs P06DF or P06E5, GO to AF13 . For all others, GO to AF2 .
No	For symptoms without DTCs, GO to AF2 . For all others, RETURN to Section 3, Symptom Charts for further direction.

AF2 REPROGRAM THE GPCM OR UPDATE THE GPCM CALIBRATION

Note: Wait for 2 minutes before disconnecting the GPCM connectors.

- Ignition OFF.
- For F-150 and F-Series Super Duty,
- Disconnect all the GPCM connectors.
- Visually inspect for:
 - pushed out pins
 - corrosion
 - damaged seals
- Connect all the GPCM connectors.
- Make sure the GPCM connectors are seated correctly.
- Ignition ON, engine OFF.
- Clear the PCM DTCs.
- Carry out the PCM self-test.
- If any glow plug DTCs are retrieved again, turn the ignition OFF and wait for 2 minutes.
- Reprogram the GPCM or update the GPCM calibration. REFER to Section 2, [Flash Electrically Erasable Programmable Read Only Memory \(EEPROM\)](#).
- Clear the PCM DTCs.
- Carry out the PCM self-test.
- For Transit,
- Disconnect all the GPCM connectors.
- Visually inspect for:
 - pushed out pins
 - corrosion
 - damaged seals
- Connect all the GPCM connectors.
- Make sure the GPCM connectors are seated correctly.
- Ignition ON, engine OFF.
- Clear the PCM DTCs.
- Carry out the PCM self-test.
- If any glow plug DTCs are retrieved again, turn the ignition OFF and wait for 2 minutes.
- Clear the PCM DTCs.

- Carry out the PCM self-test.
- For all others,
- GPCM-A connector disconnected.
- GPCM-B connector disconnected.
- GPCM-C connector disconnected.
- Visually inspect for:
 - pushed out pins
 - corrosion
 - damaged seals
- GPCM-A connector connected.
- GPCM-B connector connected.
- GPCM-C connector connected.
- Make sure the GPCM connectors are seated correctly.
- Ignition ON, engine OFF.
- Clear the PCM DTCs.
- Carry out the KOER Glow Plug Monitor self-test.
- If any glow plug DTCs are retrieved again, turn the ignition OFF and wait for 2 minutes.
- Reprogram the GPCM or update the GPCM calibration. REFER to Section 2, [Flash Electrically Erasable Programmable Read Only Memory \(EEPROM\)](#).
- Clear the PCM DTCs.
- Carry out the KOER Glow Plug Monitor self-test.

Are any glow plug DTCs retrieved again?

Yes	For DTCs P064C and P263E, GO to AF13 . For DTCs P138B and P263C, GO to AF4 . For all others, GO to AF3 .
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

AF3 CHECK THE SUSPECT GLOW PLUG RESISTANCE

Note: Use the component connector information to match the connector pins with the DTCs.

- Ignition OFF.
- Glow Plug connector disconnected.
- Check for loose, damaged, or backed out terminals.
- Measure the resistance between:

(+) Glow Plug Connector, Component Side	(-)
Suspect Glow Plug	Ground

Is the resistance less than 2 ohms?

Yes	GO to AF4 .
No	For F-150, F-Series Super Duty and Transit, INSTALL a new Glow Plug. REFER to the Workshop Manual Section 303-07, Glow Plug System. Clear the PCM DTCs. REPEAT the self-test. For all others, INSTALL a new Glow Plug. REFER to the Workshop Manual Section 303-07, Glow Plug System. Carry out the KOER Glow Plug Monitor self-test. Clear the PCM DTCs. REPEAT the self-test.

AF4 CHECK THE VBATT CIRCUIT FOR VOLTAGE

Note: Wait for 2 minutes before disconnecting the GPCM connectors.

- Ignition OFF.
- For Transit Connect,
- GPCM-B connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) GPCM-B Connector, Harness Side	(-)
VBATT - Pin 2, 4	Ground

- For all others,
- GPCM-A connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) GPCM-A Connector, Harness Side	(-)
VBATT	Ground

Is the voltage greater than 10.5 V?

Yes	For DTCs P138B and P263C, GO to AF8 . For all others, GO to AF5 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

AF5 CHECK THE GLOW PLUG CIRCUIT FOR AN OPEN

Note: Wait for 2 minutes before disconnecting the GPCM connectors.

Note: The F-150 only has 6 glow plugs. The Transit Connect only has 4 glow plugs. Only the suspect glow plug needs to be diagnosed.

- Ignition OFF.
- For Transit,
- GPCM-B connector disconnected.
- Measure the resistance between:

(+) GPCM-B Connector, Harness Side	(-) Glow Plug Connector, Harness Side
Glow Plug Number 1	Suspect Glow Plug
Glow Plug Number 2	Suspect Glow Plug
Glow Plug Number 3	Suspect Glow Plug
Glow Plug Number 4	Suspect Glow Plug
Glow Plug Number 5	Suspect Glow Plug

- For Transit Connect,
- GPCM-A connector disconnected.
- Measure the resistance between:

(+) GPCM-A Connector, Harness Side	(-) Glow Plug Connector, Harness Side
Glow Plug Number 1	Suspect Glow Plug
Glow Plug Number 2	Suspect Glow Plug
Glow Plug Number 3	Suspect Glow Plug
Glow Plug Number 4	Suspect Glow Plug

- For all others,
- GPCM-B connector disconnected.
- Measure the resistance between:

(+) GPCM-B Connector, Harness Side	(-) Glow Plug Connector, Harness Side
Glow Plug Number 1	Suspect Glow Plug
Glow Plug Number 2	Suspect Glow Plug
Glow Plug Number 3	Suspect Glow Plug
Glow Plug Number 4	Suspect Glow Plug
Glow Plug Number 5	Suspect Glow Plug
Glow Plug Number 6	Suspect Glow Plug
Glow Plug Number 7	Suspect Glow Plug
Glow Plug Number 8	Suspect Glow Plug

Are the resistances less than 5 ohms?

Yes	GO to AF6 .
No	For F-150, F-Series Super Duty and Transit, REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test. For all others, REPAIR the open circuit. Carry out the KOER Glow Plug Monitor self-test. Clear the PCM DTCs. REPEAT the self-test.

AF6 CHECK THE GLOW PLUG CIRCUIT FOR A SHORT TO GROUND

Note: The F-150 only has 6 glow plugs. The Transit Connect only has 4 glow plugs. Only the suspect glow plug needs to be diagnosed.

- For Transit,
- Measure the resistance between:

(+) GPCM-B Connector, Harness Side	(-)
Glow Plug Number 1	Ground
Glow Plug Number 2	Ground
Glow Plug Number 3	Ground
Glow Plug Number 4	Ground
Glow Plug Number 5	Ground

- For Transit Connect,

- Measure the resistance between:

(+) GPCM-A Connector, Harness Side	(-)
Glow Plug Number 1	Ground
Glow Plug Number 2	Ground
Glow Plug Number 3	Ground
Glow Plug Number 4	Ground

- For all others,
- Measure the resistance between:

(+) GPCM-B Connector, Harness Side	(-)
Glow Plug Number 1	Ground
Glow Plug Number 2	Ground
Glow Plug Number 3	Ground
Glow Plug Number 4	Ground
Glow Plug Number 5	Ground
Glow Plug Number 6	Ground
Glow Plug Number 7	Ground
Glow Plug Number 8	Ground

Are the resistances greater than 10K ohms?

Yes	GO to AF7 .
No	For F-150, F-Series Super Duty and Transit, REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test. For all others, REPAIR the short circuit. Carry out the KOER Glow Plug Monitor self-test. Clear the PCM DTCs. REPEAT the self-test.

AF7 CHECK THE GLOW PLUG CIRCUIT FOR A SHORT TO VOLTAGE

Note: The F-150 only has 6 glow plugs. The Transit Connect only has 4 glow plugs. Only the suspect glow plug needs to be diagnosed.

- Ignition ON, engine OFF.
- For Transit,
- Measure the voltage between:

(+) GPCM-B Connector, Harness Side	(-)
Glow Plug Number 1	Ground
Glow Plug Number 2	Ground
Glow Plug Number 3	Ground
Glow Plug Number 4	Ground
Glow Plug Number 5	Ground

- For Transit Connect,
- Measure the voltage between:

(+) GPCM-A Connector, Harness Side	(-)
Glow Plug Number 1	Ground
Glow Plug Number 2	Ground
Glow Plug Number 3	Ground
Glow Plug Number 4	Ground

- For all others,
- Measure the voltage between:

(+) GPCM-B Connector, Harness Side	(-)
Glow Plug Number 1	Ground
Glow Plug Number 2	Ground
Glow Plug Number 3	Ground
Glow Plug Number 4	Ground
Glow Plug Number 5	Ground
Glow Plug Number 6	Ground
Glow Plug Number 7	Ground
Glow Plug Number 8	Ground

Is any voltage present?

Yes	For F-150, F-Series Super Duty and Transit, REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test. For all others, REPAIR the short circuit. Carry out the KOER Glow Plug Monitor self-test. Clear the PCM DTCs. REPEAT the self-test.
No	GO to AF8 .

AF8 CHECK THE CIRCUIT FOR VOLTAGE

Note: Wait for 2 minutes before disconnecting the GPCM connectors.

- Ignition OFF.
- For F-Series Super Duty,
- GPCM-B connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) GPCM-B Connector, Harness Side	(-)
VPWR	Ground
ISP-R	Ground

- For Transit,
- GPCM-B connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) GPCM-B Connector, Harness Side	(-)
ISP-R	Ground

- For Transit Connect,
- GPCM-C connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) GPCM-C Connector, Harness Side	(-)
VPWR	Ground
ISP-R	Ground

- For all others,
- GPCM-C connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) GPCM-C Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	GO to AF9 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

AF9 CHECK THE PWRGND CIRCUIT FOR AN OPEN

- Ignition OFF.
- For F-Series Super Duty,
- Measure the resistance between:

(+) GPCM-B Connector, Harness Side	(-)
PWRGND	Ground

- For Transit,
- Measure the resistance between:

(+) GPCM-B Connector, Harness Side	(-)
PWRGND	Ground

- For Transit Connect,
- Measure the resistance between:

(+) GPCM-C Connector, Harness Side	(-)
PWRGND	Ground

- For all others,
- Measure the resistance between:

(+) GPCM-C Connector, Harness Side	(-)
PWRGND	Ground

Is the resistance less than 5 ohms?

Yes	For DTC P138B, GO to AF13 . For all others, GO to AF10 .
No	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

AF10 CHECK THE CAN2 CIRCUITS FOR AN OPEN

- Ignition OFF.
- For F-Series Super Duty,
- GPCM-B connector disconnected.
- PCM-B connector disconnected.
- Measure the resistance between:

(+) GPCM-B Connector, Harness Side	(-) PCM-B Connector, Harness Side
CAN2+	CAN2+
CAN2-	CAN2-

- For Transit,
- GPCM-B connector disconnected.
- PCM-T connector disconnected.
- Measure the resistance between:

(+) GPCM-B Connector, Harness Side	(-) PCM-T Connector, Harness Side
CAN2+	CAN2+ - Pin 35
CAN2-	CAN2- - Pin 36

- For all others,
- GPCM-C connector disconnected.
- PCM-B connector disconnected.
- Measure the resistance between:

(+) GPCM-C Connector, Harness Side	(-) PCM-B Connector, Harness Side
CAN2+	CAN2+
CAN2-	CAN2-

Are the resistances less than 5 ohms?

Yes	GO to AF11 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

AF11 CHECK THE CAN2 CIRCUITS FOR A SHORT TO GROUND

- NOx11 Module connector disconnected.
- NOx12 Module connector disconnected.
- PM11 Module connector disconnected.
- Reductant Dosage Control Module connector disconnected.
- Reductant Quality Module connector disconnected.
- TCM connector disconnected.
- For F-Series Super Duty,
- Measure the resistance between:

(+) GPCM-B Connector, Harness Side	(-)
CAN2+	Ground
CAN2-	Ground

- For Transit,
- Measure the resistance between:

(+) GPCM-B Connector, Harness Side	(-)
CAN2+	Ground
CAN2-	Ground

- For all others,
- Measure the resistance between:

(+) GPCM-C Connector, Harness Side	(-)
CAN2+	Ground
CAN2-	Ground

Are the resistances greater than 10K ohms?

Yes	GO to AF12 .
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

AF12 CHECK THE CAN2 CIRCUITS FOR A SHORT TO VOLTAGE

- Ignition ON, engine OFF.
- For F-Series Super Duty,
- Measure the voltage between:

(+) GPCM-B Connector, Harness Side	(-)
CAN2+	Ground
CAN2-	Ground

- For Transit,
- Measure the voltage between:

(+) GPCM-B Connector, Harness Side	(-)
CAN2+	Ground
CAN2-	Ground

- For all others,
- Measure the voltage between:

(+) GPCM-C Connector, Harness Side	(-)
CAN2+	Ground
CAN2-	Ground

Is any voltage present?

Yes	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No	GO to AF13 .

AF13 CHECK FOR CORRECT GPCM OPERATION

Note: Wait for 2 minutes before disconnecting the GPCM connectors.

- Ignition OFF.
- Disconnect all the GPCM connectors.
- Visually inspect for:
 - pushed out pins
 - corrosion
- Connect all the GPCM connectors and make sure they seat correctly.
- NOx11 Module connector connected.
- NOx12 Module connector connected.
- PM11 Module connector connected.
- Reductant Dosage Control Module connector connected.
- Reductant Quality Module connector connected.
- TCM connector connected.
- For F-150, F-Series Super Duty and Transit,
- Carry out the PCM self-test and verify the concern is still present.
- For all others,
- Carry out the GPCM self-test and verify the concern is still present.

Is the concern still present?

Yes	For F-150 and Transit, INSTALL a new GPCM. REFER to the Workshop Manual Section 303-07, Glow Plug System. Clear the PCM DTCs. REPEAT the self-test. For all others, INSTALL a new GPCM. REFER to the Workshop Manual Section 303-07, Glow Plug System. CLEAR the GPCM and PCM DTCs. REPEAT the self-test.
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

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