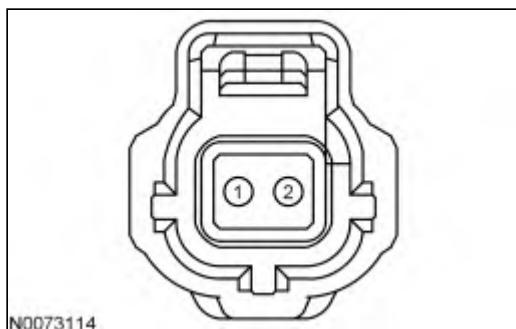
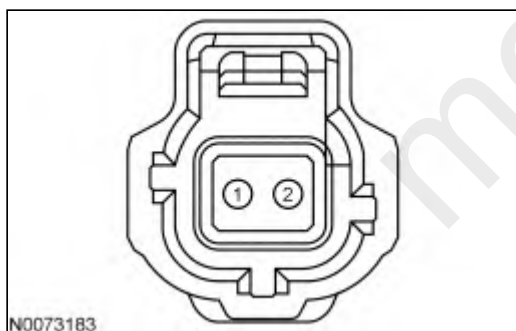
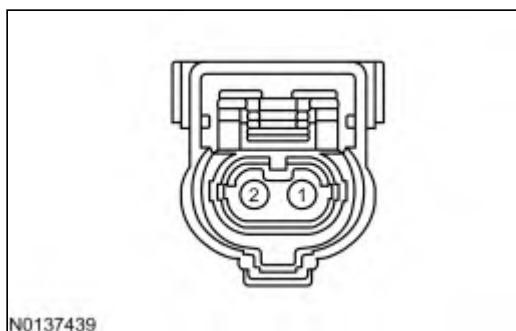


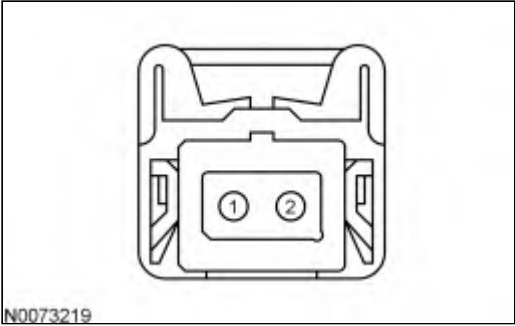
AZ: Exhaust Gas Recirculation (EGR) Cooler System

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: EGRCBV and VPWR
- EGR cooler (9F464) (9V466)
- PCM (12A650)

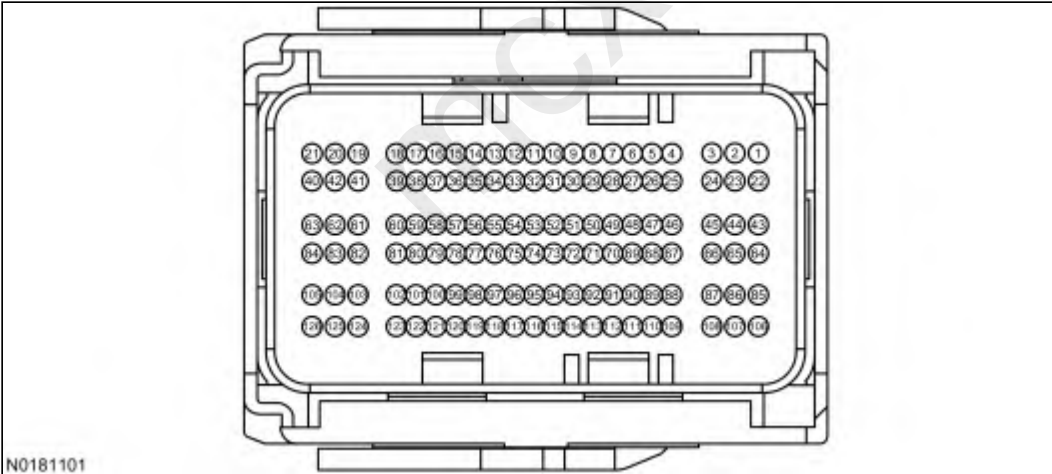
Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid Connector**A****B****C****D**



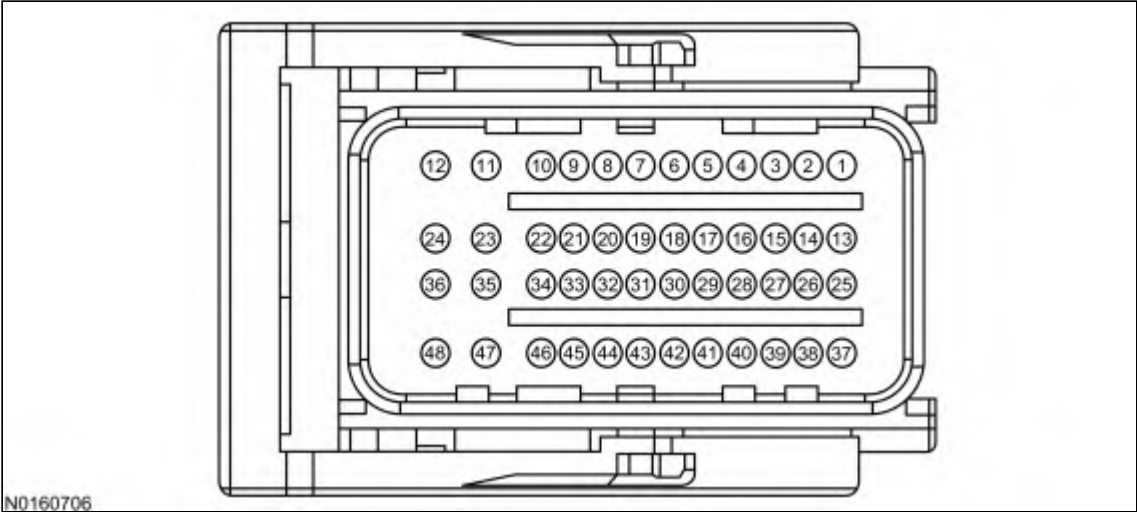
Vehicle	Connector	Pin	Circuit
F-150	A	2 1	EGRCBV VPWR
F-Series Super Duty	B	2 1	EGRCBV VPWR
Transit Connect	C	2 1	EGRCBV VPWR
All other vehicles	D	2 1	EGRCBV VPWR

Powertrain Control Module-E (PCM-E) Connector

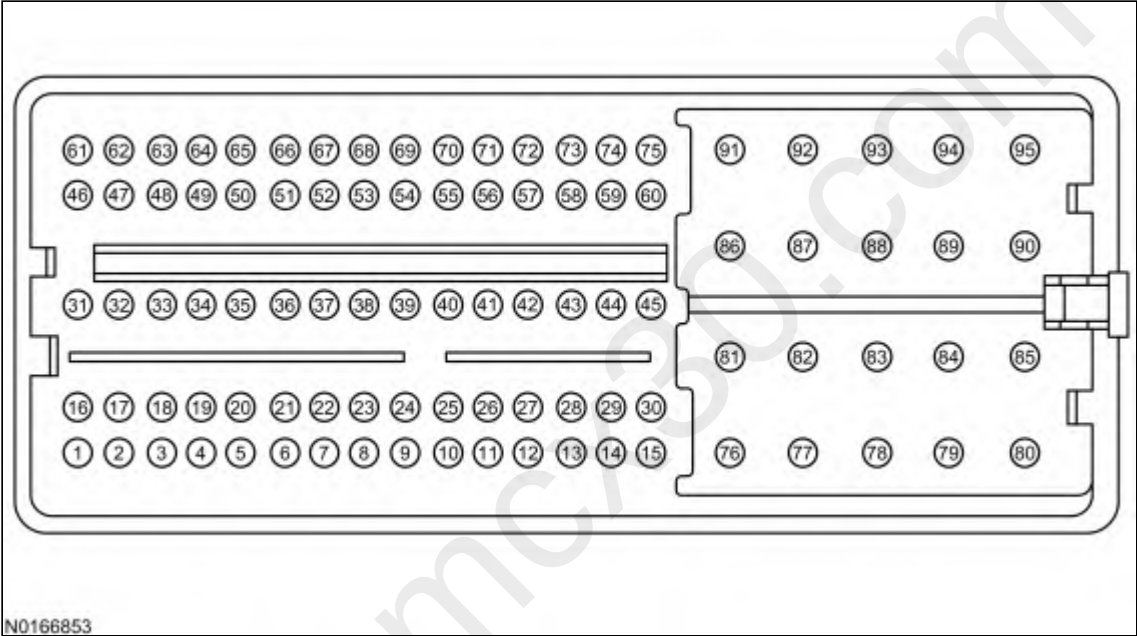
A



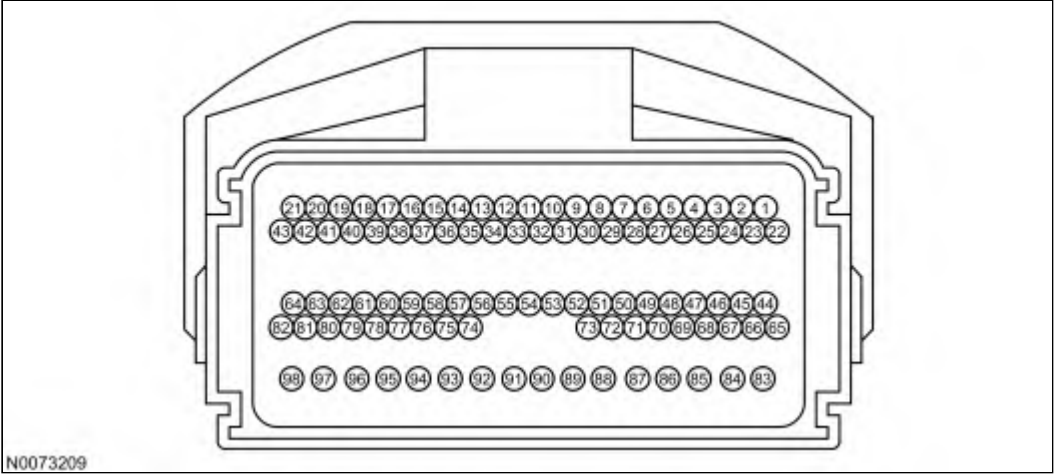
B



C



D



Vehicle	Connector	Pin	Circuit
F-Series Super Duty	A	64	EGRCBV
Transit	B	39	EGRCBV
Transit Connect	C	82	EGRCBV
All other vehicles	D	66	EGRCBV

AZ1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCs)

Are DTCs P0401, P0402, P042E, P04D9, P04DA, P1408, P2425, P2426, P2427, P2457, P245A, P245B, P245C, P245D or P24A5 present?

Yes	For DTCs P2425, P2426, P2427, or P245A. GO to AZ2 . For all others, GO to AZ7 .
No	For symptoms without DTCs, GO to AZ7 . For all others, RETURN to Section 3, Symptom Charts for further direction.

AZ2 CHECK THE VPWR CIRCUIT FOR AN OPEN

- Ignition OFF.
- Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	GO to AZ3 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

AZ3 CHECK THE EGRCBV CIRCUIT FOR AN OPEN

- Ignition OFF.
- PCM-E connector disconnected.
- Measure the resistance between:

(+) Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid Connector, Harness Side	(-) PCM-E Connector, Harness Side
EGRCBV	EGRCBV

Is the resistance less than 5 ohms?

Yes	GO to AZ4 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

AZ4 CHECK THE EGRCBV CIRCUIT FOR A SHORT TO GROUND

- Measure the resistance between:

(+) Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid Connector, Harness Side	(-)
EGRCBV	Ground

Is the resistance greater than 10K ohms?

Yes	GO to AZ5 .
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

AZ5 CHECK THE EGRCBV CIRCUIT FOR A SHORT TO VOLTAGE

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

(+) Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid Connector, Harness Side	(-)
EGRCBV	Ground

Is any voltage present?

Yes	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No	GO to AZ6 .

AZ6 CHECK THE EGR COOLER BYPASS VALVE SOLENOID FOR THE CORRECT RESISTANCE

- Ignition OFF.
- Measure the resistance between:

(+) Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid Connector, Component Side	(-) Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid Connector, Component Side
VPWR	EGRCBV

Is the resistance between 10 - 40 ohms?

Yes	For DTCs P2425, P2426, P2427, GO to AZ15 . For all others, GO to AZ7 .
No	INSTALL a new Exhaust Gas Recirculation (EGR) Cooler Bypass Valve solenoid. Refer to the Workshop Manual Section 303-08, Engine Emission Control. Clear the PCM DTCs. REPEAT the self-test.

AZ7 CARRY OUT A VISUAL INSPECTION

Note: When checking the EGR cooler bypass valve actuator for sticking or binding it is normal to notice some inconsistent movement.

- Visually inspect for:
 - damaged or leaking vacuum lines

- damaged EGR cooler bypass valve actuator or linkage
- damaged EGR cooler bypass valve solenoid
- Manually move the EGR cooler bypass valve actuator to check for sticking or binding.

Is a concern present?

Yes	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	GO to AZ8 .

AZ8 CHECK THE COOLING SYSTEM

- Ignition OFF.
- PCM-E connector connected.
- Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid connector connected.
- Check the cooling system for a system overheating condition or a low coolant condition. Refer to the Workshop Manual Section 303-03, Engine Cooling, Inspection and Verification.

Is the cooling system overheating or is a low coolant condition present?

Yes	REPAIR as necessary. REFER to the Workshop Manual Section 303-03, Engine Cooling, Symptom Chart to diagnose the system overheats symptom or loss of coolant symptom. Clear the PCM DTCs. REPEAT the self-test.
No	For F-150 and Transit, GO to AZ9 . For all others, GO to AZ10 .

AZ9 CHECK THE EGR FLOW THROUGH THE EGR COOLER

Note: Verify the engine coolant temperature (ECT) is greater than 70°C (158°F) before testing (F-150). Verify the engine oil temperature (EOT) is greater than 60°C (140°F) before testing (All others).

- Ignition ON, engine running.
- Access the PCM and monitor the ECT1 (TEMP) PID.
- Access the PCM and monitor the EOT (TEMP) and EGRTC (TEMP) PIDs.
- Access the PCM and monitor the MAF (FLOW) PID.
- Access the PCM and control the VGTDC (PER) PID.
- Command the VGTDC PID to 80% (F-150) or 100% (all others).
- Access the PCM and control the RPMDSD (RPM) PID.
- Increase the RPM_DSD PID to approximately 2000 (F-150) or 1,800 RPM (all others).
- Access the PCM and control the EGRVPDES (PER) PID.
- Command the EGRVPDES PID to 50% (F-150) or 40% (all others).
- Access the PCM and control the EGRCBV (MODE) PID.
- Command the EGRCBV PID ON, wait 5 seconds, then command the EGRCBV PID OFF.

Monitor the MAF PID and the EGRTC PID values while commanding the EGRCBV_DSD PID ON and then OFF.

Does the MAF PID increase by less than 0.008 kg/s (8 g/s) (F-150) or 0.005 kg/s (5 g/s) (all others) and does the EGRTC PID decrease by more than 15° C (27°F) (F-150) or 25° C (45.83° F) (all others)?

Yes	The system is operating correctly at this time. RETURN to section 3, for further direction.
No	GO to AZ13 .

AZ10 VISUALLY CHECK THE FUNCTIONALITY OF THE EGR COOLER BYPASS VALVE

Note: When the ignition is OFF, the EGR cooler bypass valve linkage will be fully extended.

- Ignition OFF.
- Observe the position of the EGR cooler bypass valve linkage.

- Ignition ON, engine running.
- Observe the position of the EGR cooler bypass valve linkage.

Did the EGR cooler bypass valve linkage change from fully extended to fully retracted?

Yes	GO to AZ11 .
No	For EGR cooler bypass valve linkage is always retracted. GO to AZ11 . For all others, GO to AZ13 .

AZ11 CHECK FOR A STUCK OPEN EGR COOLER BYPASS VALVE SOLENOID

Note: The EGR cooler bypass valve is normally closed with the engine OFF or when commanded to 0% duty cycle. EGR flow is directed through the EGR cooler when the EGR cooler bypass valve is closed.

- Ignition OFF.
- Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid connector disconnected.
- Ignition ON, engine running.

Is the EGR cooler bypass valve linkage fully retracted?

Yes	INSTALL a new Exhaust Gas Recirculation (EGR) Cooler Bypass Valve solenoid. Refer to the Workshop Manual Section 303-08, Engine Emission Control. Clear the PCM DTCs. REPEAT the self-test.
No	For Transit Connect, GO to AZ13 . For all others, GO to AZ12 .

AZ12 CHECK THE EGR FLOW THROUGH THE EGR COOLER

Note: Verify the engine oil temperature (EOT) is greater than 60°C (140°F) before testing.

- Exhaust Gas Recirculation (EGR) Cooler Bypass Valve Solenoid connector connected.
- Ignition ON, engine running.
- Access the PCM and monitor the EOT (TEMP) and EGRTC (TEMP) PIDs.
- Access the PCM and control the VGTDC (PER) PID.
- Command the VGTDC PID to 60%.
- Access the PCM and control the RPMDS (RPM) PID.
- Increase the RPMDS PID to approximately 1,500 RPM.
- Access the PCM and control the EGRTD_CMD (PER) PID.
- Command the EGRTD_CMD to 0%.
- Access the PCM and control the EGRVPDES (PER) PID.
- Command the EGRVPDES PID to approximately 60% (F-Series Super Duty and F-650-750) or 53% (all others).
- Access the PCM and control the EGRCBV (MODE) PID.
- For F-Series Super Duty command EGRCBV to 100%, wait 5 seconds, then command EGRCBV to 0%.
- For all others command the EGRCBV PID ON, wait 5 seconds, then command the EGRCBV PID OFF.
- Monitor the MAF PID and the EGRTC PID values while commanding the EGRCBV PID from ON to OFF.
- Access the PCM and monitor the MAF (FLOW) PID.

Does the MAF PID increase by less than 0.014 kg/s (14 g/s) and does the EGRTC PID decrease by more than 28°C (50°F) (F-Series Super Duty pickup), 23°C (41°F) (F-Series Super Duty Stripped Chassis) or 30° C (55° F) (all others)?

Yes	The system is operating correctly at this time. RETURN to section 3, for further direction.
No	REFER to the Workshop Manual Section 303-08, Engine Emission Control, Disassembly and Assembly. INSPECT the EGR cooler bypass valve. INSPECT the EGR cooler core. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

AZ13 CHECK FOR VACUUM AT THE EGR COOLER BYPASS VALVE ACTUATOR

- Ignition OFF.
- Disconnect the EGR cooler bypass valve actuator vacuum hose.
- Connect the DSL ENG Pressure Test Kit 014-00761 or equivalent to the EGR cooler bypass valve actuator vacuum hose.
- Ignition ON, engine running.

Is 78 kPa (23 in-Hg) or greater vacuum present at the EGR cooler bypass valve actuator vacuum hose?

Yes	INSTALL a new EGR cooler bypass valve actuator. Refer to the Workshop Manual Section 303-08, Engine Emission Control. Clear the PCM DTCs. REPEAT the self-test.
No	GO to AZ14 .

AZ14 CHECK FOR VACUUM AT THE EGR COOLER BYPASS VALVE SOLENOID

- Ignition OFF.
- Disconnect the EGR cooler bypass solenoid vacuum hose from the EGR cooler bypass valve solenoid.
- Connect the DSL ENG Pressure Test Kit 014-00761 or equivalent to the bypass solenoid vacuum hose.
- Ignition ON, engine running.

Is 67.73 kPa (20 in-Hg) or greater vacuum present at the EGR cooler bypass solenoid vacuum hose?

Yes	INSTALL a new Exhaust Gas Recirculation (EGR) Cooler Bypass Valve solenoid. Refer to the Workshop Manual Section 303-08, Engine Emission Control. Clear the PCM DTCs. REPEAT the self-test.
No	DIAGNOSE a loss of vacuum concern. CHECK the vacuum hoses for a leak or restriction. CHECK the vacuum pump for correct operation. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

AZ15 CHECK FOR CORRECT PCM OPERATION

- Disconnect all the PCM connectors.
- Visually inspect for:
 - pushed out pins
 - corrosion
- Connect all the PCM connectors and make sure they seat correctly.
- Carry out the PCM self-test.
- Verify the concern is still present.

Is the concern still present?

Yes	INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) , Programming the VID Block for a Replacement PCM.
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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