

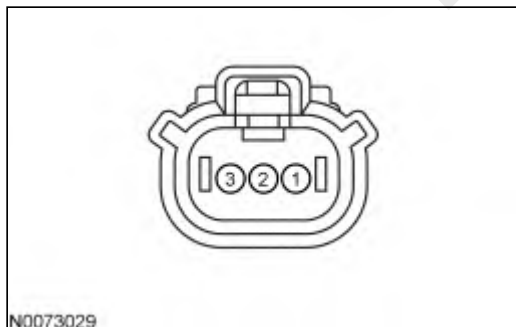
JB: Secondary Ignition (COP)

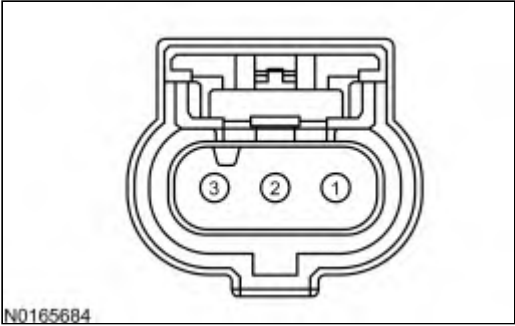
NOTICE: A damaged ignition system may cause high catalyst temperatures. Check the components next to the catalyst and muffler for heat damage.

This pinpoint test is intended to diagnose the following:

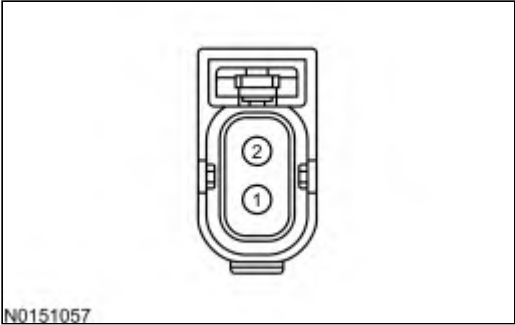
- spark plugs (12405)
- secondary side of the coil
- exhaust spark plug wire (12286) (6.2L engine only)

Vehicle	Firing Order for Coil On Plug Applications
Fusion 1.5L	1 2 4 3
E-Series, F-150 5.0L, F-Series Super Duty 6.2L, F-Series Super Duty 7.3L, Motorhome / Stripped Chassis / Step Van, Mustang 5.0L	1 5 4 8 6 3 7 2
Mustang 5.2L	1 5 4 8 3 7 2 6
3-cylinder applications	1 2 3
4-cylinder applications	1 3 4 2
6-cylinder applications	1 4 2 5 3 6
8-cylinder applications	1 3 7 2 6 5 4 8

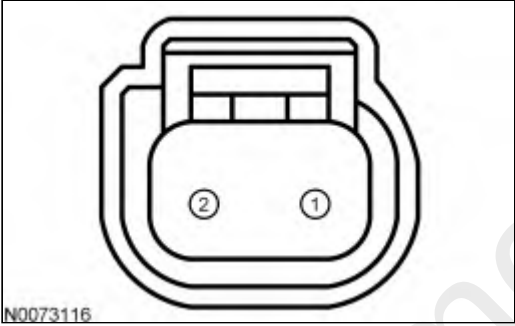
Coil On Plug (COP) Connector**A****B**



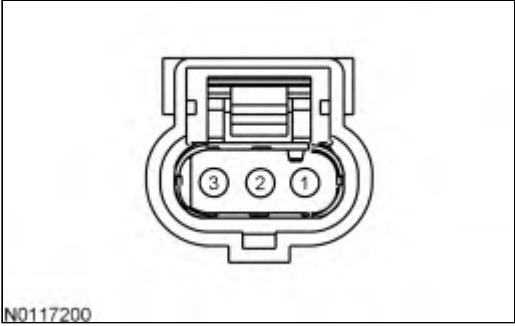
C



D



E



Vehicle	Connector	Pin	Circuit
Continental 3.7L, Flex, Transit GTDI 3.5L	A	3	VPWR

Vehicle	Connector	Pin	Circuit
Corsair 2.5L, Escape/Kuga 2.5L, Explorer 3.3L, F-150 3.3L, Mustang 5.0L, Transit TiVCT 3.5L	B	3	VPWR
E-Series	A	1	VPWR
EcoSport 1.5L, KA	C	2	VPWR
F-150 5.0L, Mustang 5.2L	B	1 (Cylinder 3), 3 (All Others)	VPWR
F-650 / F-750	D	1	VPWR
F-Series Super Duty, Motorhome / Stripped Chassis / Step Van	B	1	VPWR
Fusion 2.5L, Ranger 2.5L, Transit Connect 2.5L	D	2	VPWR
All other vehicles	E	3	VPWR

JB1 CHECK FOR DTCS

NOTICE: Do not disconnect any COP while the engine is running, damage to the COP or PCM may occur.

Are DTCs P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308 or P0316 present?

Yes	GO to JB2 .
No	For symptoms without DTCs, GO to JB2 . For all others, RETURN to Section 3, Symptom Charts for further direction.

JB2 CYLINDER POWER BALANCE TEST

Note: The scan tool test referenced in this step may not be available on all vehicles. Follow the YES answer if the scan tool test is not available.

- Carry out the Power Balance Test. Refer to the instruction manual provided by the scan tool manufacturer.

Are all cylinders contributing correctly during the power balance test?

Yes	GO to JB3 .
No	GO to JB4 .

JB3 VISUAL INSPECTION OF THE IGNITION SYSTEM

- Visually inspect the engine compartment to make sure all coils are correctly and securely connected.
- Examine all the wiring harnesses and connectors for damaged, burned, or overheated insulation, and loose or broken conditions.
- Make sure the vehicle battery is in good condition and all of the accessories are turned off.
- For the 6.2L engine, check the condition of the exhaust spark plug wire and boots.

Is a concern present?

Yes	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	GO to JB4 .

JB4 CHECK THE VPWR TO THE SUSPECT COIL

NOTICE: Do not disconnect any COP while the engine is running, damage to the COP or PCM may occur.

- Ignition OFF.
- Suspect Coil Assembly connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) COP Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	GO to JB5 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

JB5 MISFIRE ON CYLINDERS 1 THROUGH 10

Are DTCs P0301, P0302, P0303, P0304, P0305, P0306, P0307 or P0308 present?

Yes	For Continental 3.7L, Explorer 3.3L, F-150 3.3L, Flex 3.5L TiVCT, and Transit 3.5L TiVCT, GO to JB6 . For all others, GO to JB8 .
No	GO to JB9 .

JB6 CHECK FOR BANK 1 OR BANK 2 MISFIRE DTCS

Note: DTCs P0301, P0302, P0303 apply to bank 1 and DTCs P0304, P0305, P0306 apply to bank 2 on 6 cylinder engines.

Are DTCs P0301, P0302 or P0303 present?

Yes	GO to JB7 .
No	GO to JB8 .

JB7 CONFIRM COMPONENTS FOR CYLINDER MISFIRE

- Remove the suspect coil (as determined from the table) for the appropriate DTC. For additional information, refer to the Workshop Manual Section 303-07, Engine Ignition.
- Remove the suspect spark plug (as determined from the table) for the appropriate DTC. For additional information, refer to the Workshop Manual Section 303-07, Engine Ignition.
- Remove the suspect fuel injector (as determined from the table) for the appropriate DTC. For additional information, refer to the Workshop Manual Section 303-04, Fuel Charging and Controls.
- Remove opposite bank coil. For additional information, refer to the Workshop Manual Section 303-07, Engine Ignition.

- Remove the opposite bank spark plug. For additional information, refer to the Workshop Manual Section 303-07, Engine Ignition.
- Remove the opposite bank fuel injector. For additional information, refer to the Workshop Manual Section 303-04, Fuel Charging and Controls.
- Install removed components from bank 1 on the opposite cylinder in bank 2 and install the components removed from bank 2 in bank 1.
- Make sure the vehicle is correctly reassembled.
- Drive the vehicle to determine if the misfire is still present.
- Carry out the PCM self-test.

Does the misfire move from the suspect cylinder in bank 1 to the opposite cylinder in bank 2?

Yes	GO to JB8 .
No	GO to JB15 .

JB8 CHECK FOR SPARK AT THE CYLINDERS INDICATED BY THE DTCS

Note: A correctly operating ignition system only requires a spark when the spark gap is set to the 25-28 kV range.

- Ignition OFF.
- Remove the fuel pump fuse to disable the fuel pump.
- Disconnect the ignition coils from the spark plugs.
- Connect the Adjustable Ignition Spark Tester THX458 or equivalent to the ignition coil boot.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 40 kV.
- Crank the engine 3 times.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 25-28 kV.
- Monitor the spark tester.
- Crank the engine.
- For the 6.2L engine,
- Connect the ignition coils to the spark plugs.
- Disconnect the exhaust spark plug wires from the spark plugs.
- Connect the Adjustable Ignition Spark Tester THX458 or equivalent to the exhaust spark plug wire.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 40 kV.
- Crank the engine 3 times.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 25-28 kV.
- Monitor the spark tester.
- Crank the engine.

Is a spark present when the spark gap is set to 25-28 kV while cranking the engine?

Yes	GO to JB13 .
No	For Continental 3.7L, Corsair 2.5L, E-Series, EcoSport 1.5L, Escape/Kuga 2.5L, Explorer 3.3L, F-150 3.3L, F-150 5.0L, F-650 / F-750, F-Series Super Duty, Flex 3.5L TiVCT, Fusion 2.5L, KA, Motorhome / Stripped Chassis / Step Van, Mustang 5.0L,

Mustang 5.2L,
 Ranger 2.5L,
 Transit 3.5L TiVCT, and
 Transit Connect 2.5L, GO to [JB10](#).
 For all others, INSTALL a new COP.
 Clear the PCM DTCs. REPEAT the self-test.

JB9 CHECK FOR SPARK AT ALL CYLINDERS

Note: A correctly operating ignition system only requires a spark when the spark gap is set to the 25-28 kV range.

- Ignition OFF.
- Remove the fuel pump fuse to disable the fuel pump.
- Disconnect the ignition coils from the spark plugs.
- Connect the Adjustable Ignition Spark Tester THX458 or equivalent to the ignition coil boot.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 40 kV.
- Crank the engine 3 times.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 25-28 kV.
- Monitor the spark tester.
- Crank the engine.
- For the 6.2L engine,
- Connect the ignition coils to the spark plugs.
- Disconnect the exhaust spark plug wires from the spark plugs.
- Connect the Adjustable Ignition Spark Tester THX458 or equivalent to the exhaust spark plug wire.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 40 kV.
- Crank the engine 3 times.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 25-28 kV.
- Monitor the spark tester.
- Crank the engine.

Is a spark present in all cylinders when the spark gap is set to 25-28 kV while cranking the engine?

Yes	GO to JB13 .
No	RECORD the cylinders with inconsistent spark. For Continental 3.7L, Corsair 2.5L, E-Series, EcoSport 1.5L, Escape/Kuga 2.5L, Explorer 3.3L, F-150 3.3L, F-150 5.0L, F-650 / F-750, F-Series Super Duty, Flex 3.5L TiVCT, Fusion 2.5L, KA, Motorhome / Stripped Chassis / Step Van, Mustang 5.0L, Mustang 5.2L, Ranger 2.5L, Transit 3.5L TiVCT, and Transit Connect 2.5L, GO to JB10.

For all others, INSTALL a new COP. Clear the PCM DTCs. REPEAT the self-test.

JB10 COMPONENT INSPECTION

- Inspect the coil boots for the missing cylinders for damaged insulation and burns. Install a new coil boot if necessary. Refer to the Workshop Manual Section 303-07, Engine Ignition.
- Inspect the spark plugs for the missing cylinders. Measure the resistance of the spark plugs from the center wire to the terminal. Install a new spark plug if the resistance is lower than 2,000 ohms or higher than 12,000 ohms at a room temperature of 25°C (77°F).
- For the 6.2L engine,
- Inspect the exhaust spark plug wires for damaged insulation and burns in either of the boots for the missing cylinders. Install a new exhaust spark plug wire if the resistance is lower than 5,875 ohms or higher than 7,875 ohms at a room temperature of 25°C (77°F).

Is a concern present?

Yes	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	For F-650 / F-750, Fusion 2.5L and Transit Connect 2.5L, GO to JB11 . For E-Series, and F-Series Super Duty 6.2L, GO to JB12 . For all others, INSTALL a new COP. Clear the PCM DTCs. REPEAT the self-test.

JB11 CHECK THE SECONDARY COIL RESISTANCE FOR THE MISSING CYLINDERS

- Ignition OFF.
- Suspect Coil Assembly connector disconnected.
- Measure resistance between: Suspect coil connector, VPWR, component side and ignition coil spring, located in the ignition coil boot.

Is the resistance between 5,000 and 6,000 ohms?

Yes	GO to Pinpoint Test Z .
No	INSTALL a new COP. Clear the PCM DTCs. REPEAT the self-test.

JB12 CHECK THE SECONDARY COIL RESISTANCE

- Ignition OFF.
- Measure resistance between: Suspect coil high voltage tower center pin, located on the side of the COP, and the ignition coil spring, located in the ignition coil boot.

Is the resistance between 33,900 ohms and 41,500 ohms at a room temperature of 25°C (77°F)?

Yes	GO to Pinpoint Test Z .
No	INSTALL a new COP. Clear the PCM DTCs. REPEAT the self-test.

JB13 CHECK THE SPARK PLUGS

Note: To determine the condition of the spark plugs, refer to the Workshop Manual Section 303-00, Engine and carry out the Spark Plug Inspection.

- Ignition OFF.
- Remove and inspect the spark plugs for damage, wear, carbon tracking or deposits and correct spark plug gap.

Are the plugs OK?

Yes	GO to JB14 .
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No	REPAIR the spark plugs. ADJUST the gap or INSTALL a new spark plug as necessary. REFER to the Workshop Manual Section 303-07, Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.
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JB14 CHECK THE SPARK PLUG RESISTANCE

- Measure the spark plug resistance from the center wire to the terminal.

Is the resistance between 2,000 ohms and 12,000 ohms at a room temperature of 25°C (77°F)?

Yes	GO to JB15 .
No	INSTALL a new spark plug. REFER to the Workshop Manual Section 303-07, Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.

JB15 TEST DIRECTION FOR SYMPTOM CHARTS

Were you directed to this pinpoint test from Section 3?

Yes	RETURN to Section 3, Symptom Charts for further direction.
No	GO to JB16 .

JB16 TEST DIRECTION FOR PINPOINT TEST HD

Were you directed to this pinpoint test from pinpoint test step HD8?

Yes	GO to HD9 .
No	The concern is intermittent. GO to Pinpoint Test Z .