

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

|            |                                                                                                                                      |
|------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | GO to <a href="#">JB2</a> .                                                                                                          |
| <b>No</b>  | For symptoms without DTCs, GO to <a href="#">JB2</a> .<br>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?

|            |                             |
|------------|-----------------------------|
| <b>Yes</b> | GO to <a href="#">JB3</a> . |
| <b>No</b>  | GO to <a href="#">JB4</a> . |

**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?

|            |                                                                   |
|------------|-------------------------------------------------------------------|
| <b>Yes</b> | REPAIR as necessary.<br>Clear the PCM DTCs. REPEAT the self-test. |
| <b>No</b>  | GO to <a href="#">JB4</a> .                                       |

**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?

|            |                                                                    |
|------------|--------------------------------------------------------------------|
| <b>Yes</b> | GO to <a href="#">JB5</a> .                                        |
| <b>No</b>  | 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?

|            |                                                                                                                                                                                  |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | For Continental 3.7L,<br>Explorer 3.3L,<br>F-150 3.3L,<br>Flex 3.5L TiVCT, and<br>Transit 3.5L TiVCT, GO to <a href="#">JB6</a> .<br>For all others, GO to <a href="#">JB8</a> . |
| <b>No</b>  | GO to <a href="#">JB9</a> .                                                                                                                                                      |

**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?

|            |                             |
|------------|-----------------------------|
| <b>Yes</b> | GO to <a href="#">JB7</a> . |
| <b>No</b>  | GO to <a href="#">JB8</a> . |

**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?**

|            |                              |
|------------|------------------------------|
| <b>Yes</b> | GO to <a href="#">JB8</a> .  |
| <b>No</b>  | GO to <a href="#">JB15</a> . |

### **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?**

|            |                                                                                                                                                                                                                                                                                              |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | GO to <a href="#">JB13</a> .                                                                                                                                                                                                                                                                 |
| <b>No</b>  | For Continental 3.7L,<br>Corsair 2.5L,<br>E-Series,<br>EcoSport 1.5L,<br>Escape/Kuga 2.5L,<br>Explorer 3.3L,<br>F-150 3.3L,<br>F-150 5.0L,<br>F-650 / F-750,<br>F-Series Super Duty,<br>Flex 3.5L TiVCT,<br>Fusion 2.5L,<br>KA,<br>Motorhome / Stripped Chassis / Step Van,<br>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?**

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

|                                                                                 |
|---------------------------------------------------------------------------------|
| For all others, INSTALL a new COP.<br>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?**

|            |                                                                                                                                                                                                                                                      |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | REPAIR as necessary.<br>Clear the PCM DTCs. REPEAT the self-test.                                                                                                                                                                                    |
| <b>No</b>  | For F-650 / F-750, Fusion 2.5L and Transit Connect 2.5L, GO to <a href="#">JB11</a> .<br>For E-Series, and F-Series Super Duty 6.2L, GO to <a href="#">JB12</a> .<br>For all others, INSTALL a new COP.<br>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?**

|            |                                                              |
|------------|--------------------------------------------------------------|
| <b>Yes</b> | GO to Pinpoint Test <a href="#">Z</a> .                      |
| <b>No</b>  | 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)?**

|            |                                                              |
|------------|--------------------------------------------------------------|
| <b>Yes</b> | GO to Pinpoint Test <a href="#">Z</a> .                      |
| <b>No</b>  | 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?**

|            |                              |
|------------|------------------------------|
| <b>Yes</b> | GO to <a href="#">JB14</a> . |
|------------|------------------------------|

|           |                                                                                                                                                                                             |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>No</b> | 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.<br>Clear the PCM DTCs. REPEAT the self-test. |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**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)?

|            |                                                                                                                                      |
|------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | GO to <a href="#">JB15</a> .                                                                                                         |
| <b>No</b>  | INSTALL a new spark plug. REFER to the Workshop Manual Section 303-07, Engine Ignition.<br>Clear the PCM DTCs. REPEAT the self-test. |

**JB15 TEST DIRECTION FOR SYMPTOM CHARTS**

Were you directed to this pinpoint test from Section 3?

|            |                                                            |
|------------|------------------------------------------------------------|
| <b>Yes</b> | RETURN to Section 3, Symptom Charts for further direction. |
| <b>No</b>  | GO to <a href="#">JB16</a> .                               |

**JB16 TEST DIRECTION FOR PINPOINT TEST HD**

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

|            |                                                                         |
|------------|-------------------------------------------------------------------------|
| <b>Yes</b> | GO to <a href="#">HD9</a> .                                             |
| <b>No</b>  | The concern is intermittent.<br>GO to Pinpoint Test <a href="#">Z</a> . |

**KJ: Supercharger Bypass Control**

This pinpoint test is intended to diagnose the following:

- supercharger bypass actuator
- vacuum hoses

**KJ1 CHECK FOR DTCS**

**Note:** The DTCs P1227 and P1228 are for informational purposes only and are usually accompanied by other DTCs. If concerns are present with the turbocharger inlet pressure (TCIP) sensor or the manifold absolute pressure (MAP) sensor, the DTCs P1227 or P1228 may set. Diagnose all other DTCs before diagnosing the DTCs P1227 or P1228.

Are DTCs P1227 or P1228 present?

|            |                             |
|------------|-----------------------------|
| <b>Yes</b> | GO to <a href="#">KJ2</a> . |
| <b>No</b>  | GO to <a href="#">KJ3</a> . |

**KJ2 VERIFY THE DTC**

- Record the DTCs.
- Clear the PCM DTCs.
- Drive the vehicle at normal operating temperature with the engine exceeding 2,000 RPM.
- Carry out the PCM self-test.

Are any other DTCs present?

|            |                                                                                                                                                                                   |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to Section 4, <a href="#">Diagnostic Trouble Code (DTC) Charts and Descriptions</a> . |
| <b>No</b>  | GO to <a href="#">KJ4</a> .                                                                                                                                                       |

**KJ3 CHECK THE INTAKE AIR TEMPERATURE 2 (IAT2) PID**

 **WARNING:** To avoid personal injury do not unscrew the coolant pressure relief cap while the engine is operating or hot. The cooling system is under pressure. Steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in personal injury.

- Ignition ON, engine running.
- Access the PCM and monitor the IAT2 (TEMP) PID.

Is the temperature greater than 110° C (230°F)?

|            |                                                                                                                                                                                                  |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | CHECK for low fluid level in the charge air cooler (CAC) system. CHECK for damaged CAC lines. REFER to the Workshop Manual Section 303-03B, Supercharger Cooling, to DIAGNOSE a loss of coolant. |
| <b>No</b>  | GO to <a href="#">KJ4</a> .                                                                                                                                                                      |

**KJ4 CHECK THE SUPERCHARGER BYPASS ACTUATOR VACUUM HOSES**

- Check for correct connections, damage or restrictions in the vacuum lines going to the supercharger bypass actuator.

Are any concerns present?

|  |  |
|--|--|
|  |  |
|--|--|

|            |                                                                                               |
|------------|-----------------------------------------------------------------------------------------------|
| <b>Yes</b> | REPAIR or INSTALL new vacuum lines as necessary.<br>Clear the PCM DTCs. REPEAT the self-test. |
| <b>No</b>  | GO to <a href="#">KJ5</a> .                                                                   |

### KJ5 CHECK THE BYPASS VALVE ACTUATOR

**Note:** Additional DTCs may set as a result of disconnecting the vacuum line in this step.

- Visually inspect the bypass valve actuator for damage.
- Ignition OFF.
- Monitor the position of the supercharger bypass actuator linkage.
- Ignition ON, engine running.
- Monitor the position of the supercharger bypass actuator linkage.
- Disconnect the supercharger bypass actuator vacuum line.

**Does the supercharger bypass actuator linkage move when the engine is started, and return to the original position when the supercharger bypass actuator vacuum line is disconnected?**

|            |                                                                                                        |
|------------|--------------------------------------------------------------------------------------------------------|
| <b>Yes</b> | The concern is not present at this time. Return to Section 3, GO to Pinpoint Test <a href="#">QT</a> . |
| <b>No</b>  | INSTALL a new supercharger bypass actuator.<br>Clear the PCM DTCs. REPEAT the self-test.               |