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## Ford Mustang 2020 Manual - Complete Service & Repair

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If this change over time is large enough (gradient), the camshaft phasing change is evaluated. If the change after the diagnostic time is smaller than a threshold, a slow response is detected, and if the value is greater, then there is no concern. By detecting a concern, an antibounce counter is incremented otherwise the counter is decremented.

Refer to the DTC (diagnostic trouble code) Fault Trigger Conditions.

### DTC Fault Trigger Conditions

| DTC<br>(diagnostic<br>trouble<br>code)               | Description   | Fault Trigger Condition  |
|--|---|--|
| PCM<br>(powertrain<br>control<br>module)<br>P0010:00 | 'A' Camshaft<br>Position Actuator<br>'A' Control<br>Circuit/Open<br>Bank 1: No Sub<br>Type<br>Information | Sets when PCM (powertrain control module) detects a low or high voltage on the VCT (variable camshaft timing) bank 1, solenoid 1 circuit is detected.  |
| PCM<br>(powertrain<br>control<br>module)<br>P0011:00 | 'A' Camshaft<br>Position Timing -<br>Over-Advanced<br>(Bank 1): No Sub<br>Type<br>Information             | Sets when PCM (powertrain control module) detects the camshaft timing exceeds a maximum calibrated value or remains in an advanced position, indicating the VCT (variable camshaft timing) position is over-advanced. This DTC (diagnostic trouble code) may be accompanied by other Diagnostic Trouble Codes (DTCs). Diagnose all CMP (camshaft position) sensor Diagnostic Trouble Codes (DTCs) first. If no CMP (camshaft position) sensor related Diagnostic Trouble Codes (DTCs) are present, continue to follow diagnosis for this DTC (diagnostic trouble code) . This DTC (diagnostic trouble code) is a functional check of the VCT (variable camshaft timing) unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the appropriate 303-00 section, Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the appropriate 303-01 section, Engine, to check the engine timing and VCT phasers. |

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| <p>control module)<br/>P0015:00</p>                 | <p>Over-Retarded (Bank 1): No Sub Type Information</p>  | <p>position, indicating the VCT (variable camshaft timing) position is over-retarded. This DTC (diagnostic trouble code) may be accompanied by other Diagnostic Trouble Codes (DTCs). Diagnose all CMP (camshaft position) sensor Diagnostic Trouble Codes (DTCs) first. If no CMP (camshaft position) sensor related Diagnostic Trouble Codes (DTCs) are present, continue to follow diagnosis for this DTC (diagnostic trouble code) . This DTC (diagnostic trouble code) is a functional check of the VCT (variable camshaft timing) unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the appropriate 303-00 section, Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the appropriate 303-01 section, Engine, to check the engine timing and VCT phasers.</p>   |
| <p>PCM (powertrain control module)<br/>P0016:00</p> | <p>Crankshaft Position - Camshaft Position Correlation - Bank 1 Sensor A: No Sub Type Information</p> | <p>Sets when PCM (powertrain control module) detects a misalignment between the camshaft and crankshaft. This indicates the misalignment is 1 tooth or greater. This DTC (diagnostic trouble code) can also set due to VCT (variable camshaft timing) system concerns (oil contamination or VCT (variable camshaft timing) solenoid stuck). This DTC (diagnostic trouble code) may be accompanied by other Diagnostic Trouble Codes (DTCs). Diagnose all CMP (camshaft position) sensor Diagnostic Trouble Codes (DTCs) first. If no CMP (camshaft position) sensor related Diagnostic Trouble Codes (DTCs) are present, continue to follow diagnosis for this DTC (diagnostic trouble code) . This DTC (diagnostic trouble code) is a functional check of the VCT (variable camshaft timing) unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the appropriate 303-00 section, Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the appropriate 303-01 section, Engine, to check the engine timing and VCT phasers.</p> |
| <p>PCM (powertrain control module)<br/>P0017:00</p> | <p>Crankshaft Position - Camshaft Position Correlation - Bank 1 Sensor B: No Sub Type Information</p> | <p>Sets when PCM (powertrain control module) detects a misalignment between the camshaft and crankshaft. This indicates the misalignment is 1 tooth or greater. This DTC (diagnostic trouble code) can also set due to VCT (variable camshaft timing) system concerns (oil contamination or VCT (variable camshaft timing) solenoid stuck). This DTC (diagnostic trouble code) may be accompanied by other Diagnostic Trouble Codes (DTCs). Diagnose all CMP (camshaft position) sensor Diagnostic Trouble Codes (DTCs) first. If no CMP (camshaft position) sensor related Diagnostic Trouble Codes (DTCs) are present, continue to follow diagnosis for this DTC (diagnostic trouble code) . This DTC (diagnostic trouble code) is a functional check of the VCT (variable</p>   |

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| <p>PCM<br/>(powertrain control module)<br/>P0020:00</p> | <p>'A' Camshaft Position Actuator 'A' Control Circuit/Open Bank 2: No Sub Type Information</p> | <p>Sets when PCM (powertrain control module) detects a low or high voltage from the VCT (variable camshaft timing) bank 2 solenoid 1 circuit, indicating the voltage exceeded a calibrated limit for a calibrated amount of time.</p>  |
| <p>PCM<br/>(powertrain control module)<br/>P0021:00</p> | <p>'A' Camshaft Position Timing - Over-Advanced (Bank 2): No Sub Type Information</p>          | <p>Sets when PCM (powertrain control module) detects the camshaft timing exceeds a maximum calibrated value or remains in an advanced position, indicating the VCT (variable camshaft timing) position is over-advanced. This DTC (diagnostic trouble code) may be accompanied by other Diagnostic Trouble Codes (DTCs). Diagnose all CMP (camshaft position) sensor Diagnostic Trouble Codes (DTCs) first. If no CMP (camshaft position) sensor related Diagnostic Trouble Codes (DTCs) are present, continue to follow diagnosis for this DTC (diagnostic trouble code). This DTC (diagnostic trouble code) is a functional check of the VCT (variable camshaft timing) unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the appropriate 303-00 section, Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the appropriate 303-01 section, Engine, to check the engine timing and VCT phasers.</p> |
| <p>PCM<br/>(powertrain control module)<br/>P0022:00</p> | <p>'A' Camshaft Position Timing - Over-Retarded (Bank 2): No Sub Type Information</p>          | <p>Sets when PCM (powertrain control module) detects the camshaft timing exceeds a maximum calibrated value or remains in a retarded position, indicating the VCT (variable camshaft timing) position is over-retarded. This DTC (diagnostic trouble code) may be accompanied by other Diagnostic Trouble Codes (DTCs). Diagnose all CMP (camshaft position) sensor Diagnostic Trouble Codes (DTCs) first. If no CMP (camshaft position) sensor related Diagnostic Trouble Codes (DTCs) are present, continue to follow diagnosis for this DTC (diagnostic trouble code). This DTC (diagnostic trouble code) is a functional check of the VCT (variable camshaft timing) unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the appropriate 303-00 section, Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the appropriate 303-01 section, Engine, to check the engine timing and VCT phasers.</p>  |
| <p>PCM<br/>(powertrain control module)</p>              | <p>'B' Camshaft Position Actuator</p>  | <p>Sets when PCM (powertrain control module) detects the voltage exceeds a calibrated limit for a calibrated amount of time, indicating a</p>  |

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|---|---|---|
| <p>PCM<br/>(powertrain control module)<br/>P052A:00</p> | <p>Cold Start Intake<br/>(A) Camshaft<br/>Position Timing<br/>Over-Advanced<br/>(Bank 1): No Sub<br/>Type<br/>Information</p> | <p>Sets when PCM (powertrain control module) detects the camshaft timing exceeds a maximum calibrated value or remains in an advanced position, indicating the VCT (variable camshaft timing) position is over-advanced during cold start up. This DTC (diagnostic trouble code) is a functional check of the VCT (variable camshaft timing) unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the appropriate 303-00 section, Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the appropriate 303-01 section, Engine, to check the engine timing and VCT phasers.</p> |
| <p>PCM<br/>(powertrain control module)<br/>P052B:00</p> | <p>Cold Start Intake<br/>(A) Camshaft<br/>Position Timing<br/>Over-Retarded<br/>(Bank 1): No Sub<br/>Type<br/>Information</p> | <p>Sets when PCM (powertrain control module) detects the camshaft timing exceeds a maximum calibrated value or remains in a retarded position, indicating the variable camshaft timing (VCT) position is over-retarded during cold start up. This DTC (diagnostic trouble code) is a functional check of the VCT (variable camshaft timing) unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the appropriate 303-00 section, Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the appropriate 303-01 section, Engine, to check the engine timing and VCT phasers.</p>  |
| <p>PCM<br/>(powertrain control module)<br/>P052C:00</p> | <p>Cold Start Intake<br/>(A) Camshaft<br/>Position Timing<br/>Over-Advanced<br/>(Bank 2): No Sub<br/>Type<br/>Information</p> | <p>Sets when PCM (powertrain control module) detects the camshaft timing exceeds a maximum calibrated value or remains in an advanced position, indicating the VCT (variable camshaft timing) position is over-advanced during cold start up. This DTC (diagnostic trouble code) is a functional check of the VCT (variable camshaft timing) unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the appropriate 303-00 section, Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the appropriate 303-01 section, Engine, to check the engine timing and VCT phasers.</p> |
| <p>PCM<br/>(powertrain control module)<br/>P052D:00</p> | <p>Cold Start Intake<br/>(A) Camshaft<br/>Position Timing<br/>Over-Retarded<br/>(Bank 2): No Sub<br/>Type<br/>Information</p> | <p>Sets when PCM (powertrain control module) detects the camshaft timing exceeds a maximum calibrated value or remains in a retarded position, indicating the VCT (variable camshaft timing) position is over-retarded during cold start up. This DTC (diagnostic trouble code) is a functional check of the VCT (variable camshaft timing) unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the appropriate 303-00 section, Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the appropriate 303-01 section, Engine, to check the engine timing and VCT phasers.</p>  |

**Possible Sources**

- Radio frequency interference
- Oil pressure
- Camshaft timing
- VCT (variable camshaft timing) alignment
- VCT (variable camshaft timing) phaser
- VCT (variable camshaft timing) solenoid (6L713) or (6B297)
- Left spider assembly (6C261)
- Right spider assembly (6C260)

**Pinpoint Test Steps available in the on-line Workshop Manual.**

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Sample

## RH (right-hand) Camshaft Position (CMP) Sensors

2. • Disconnect the electrical connector, remove the retainer and the intake CMP (camshaft position) sensor.

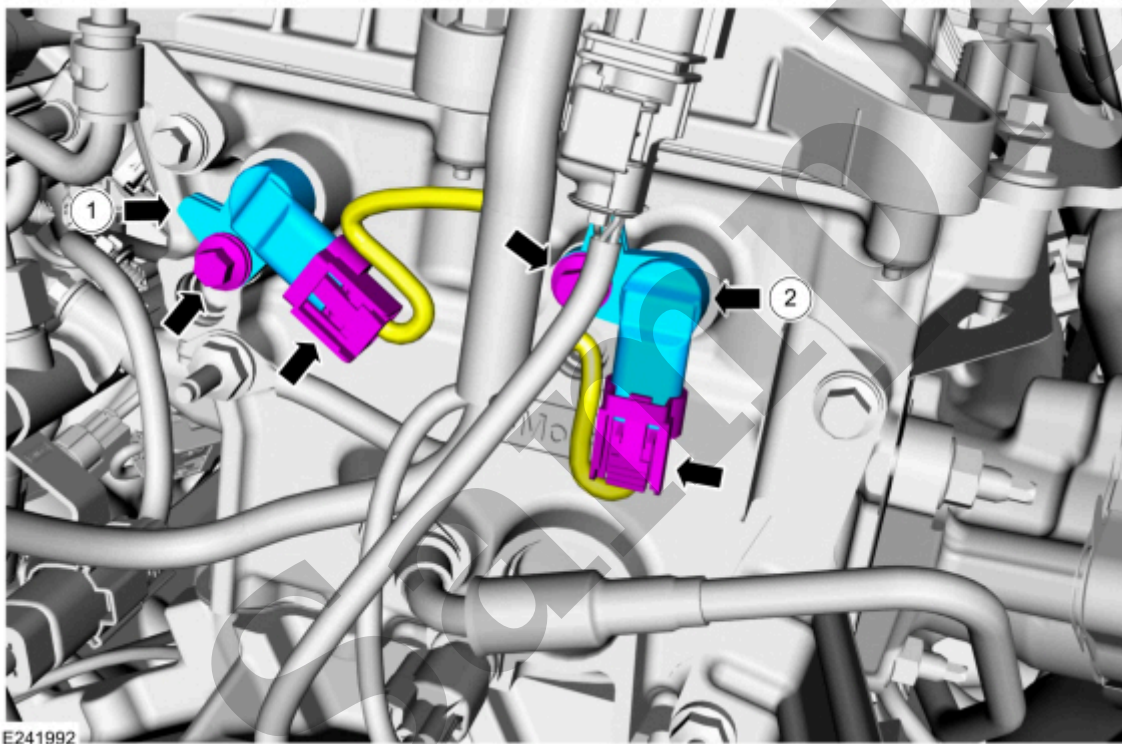
**Material** : Engine Oil - SAE 5W-30 - Synthetic Blend Motor Oil / XO-5W30-Q1SP (WSS-M2C946-B1)

**Torque** : 89 lb.in (10 Nm)

- Disconnect the electrical connector, remove the retainer and the exhaust CMP (camshaft position) sensor.

**Material** : Engine Oil - SAE 5W-30 - Synthetic Blend Motor Oil / XO-5W30-Q1SP (WSS-M2C946-B1)

**Torque** : 89 lb.in (10 Nm)



[Click here to learn about symbols, color coding, and icons used in this manual.](#)

## LH (left-hand) Camshaft Position (CMP) Sensors

3. • Disconnect the electrical connector, remove the retainer and the intake CMP (camshaft position) sensor.

**Material** : Engine Oil - SAE 5W-30 - Synthetic Blend Motor Oil / XO-5W30-Q1SP (WSS-M2C946-B1)

**Torque** : 89 lb.in (10 Nm)

## Catalyst Monitor Sensor

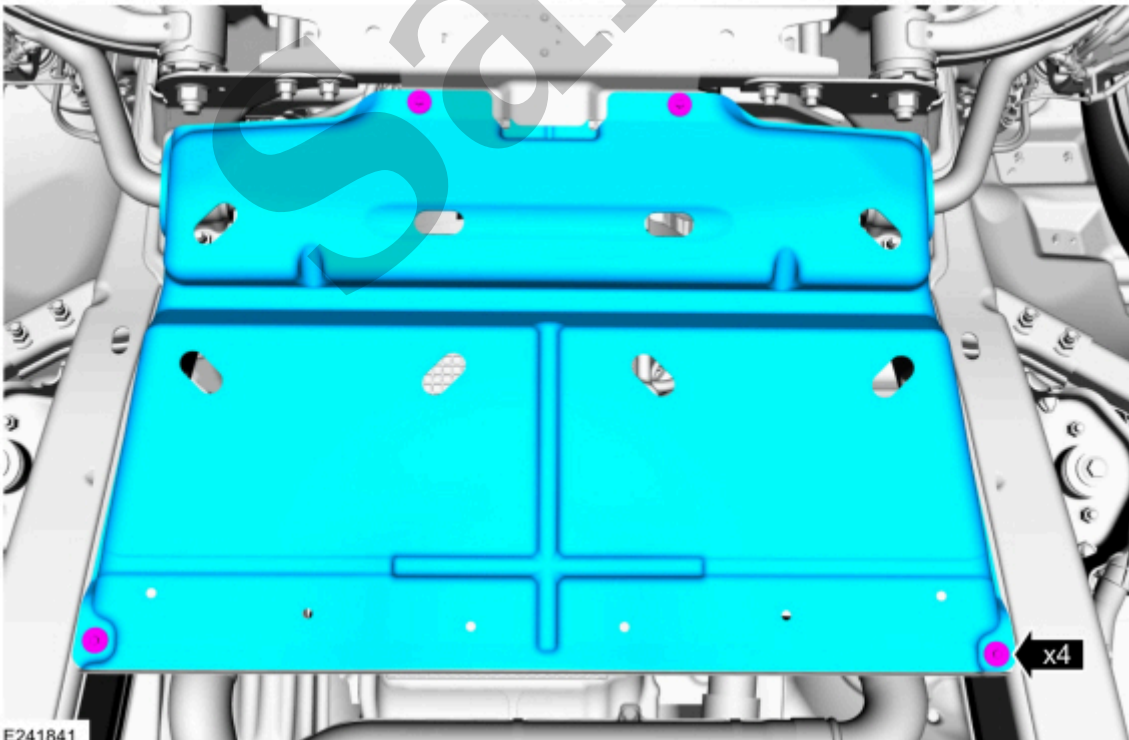
|   |  |
|---|--|
| <b>303-14E Electronic Engine Controls - 3.5L V6 PowerBoost (CN)</b> | <b>2022 F-150</b>                          |
| <b>Removal and Installation</b>                                     | <b>Procedure revision date: 05/28/2020</b> |

### Catalyst Monitor Sensor

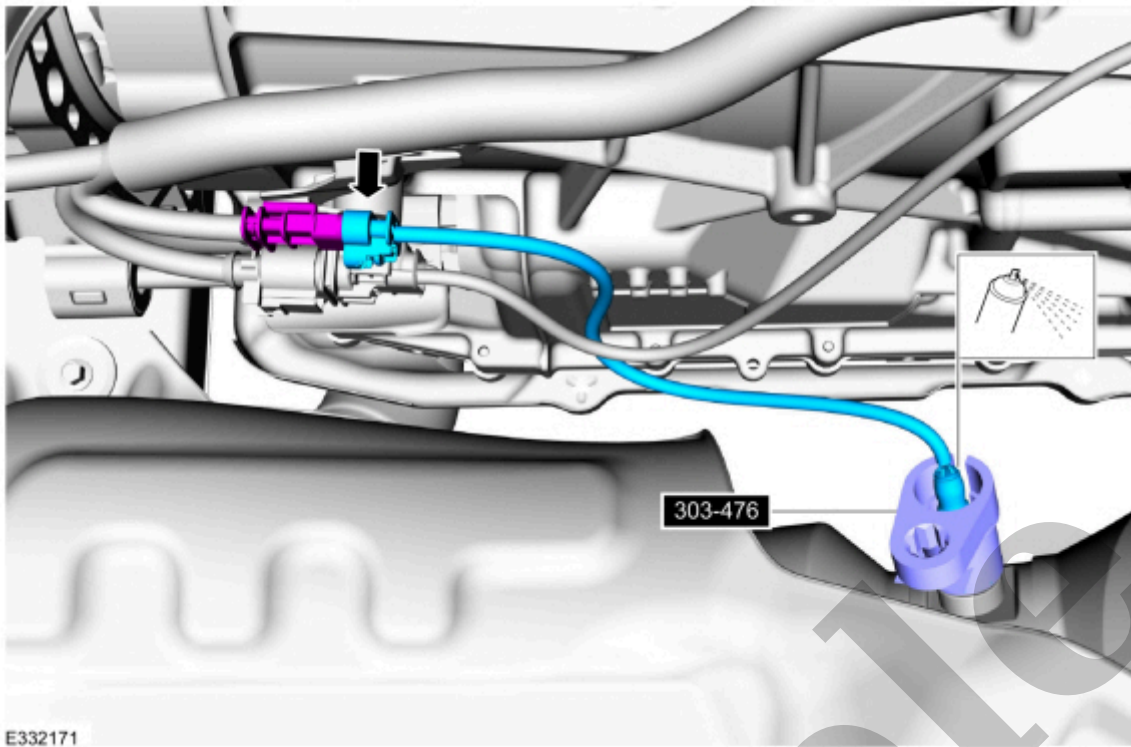
#### Removal

##### All sensors

1. With the vehicle in NEUTRAL, position it on a hoist.  
Refer to: [Jacking and Lifting - Overview](#)(100-02 Jacking and Lifting, Description and Operation).
2. If equipped, remove the underbody shield.







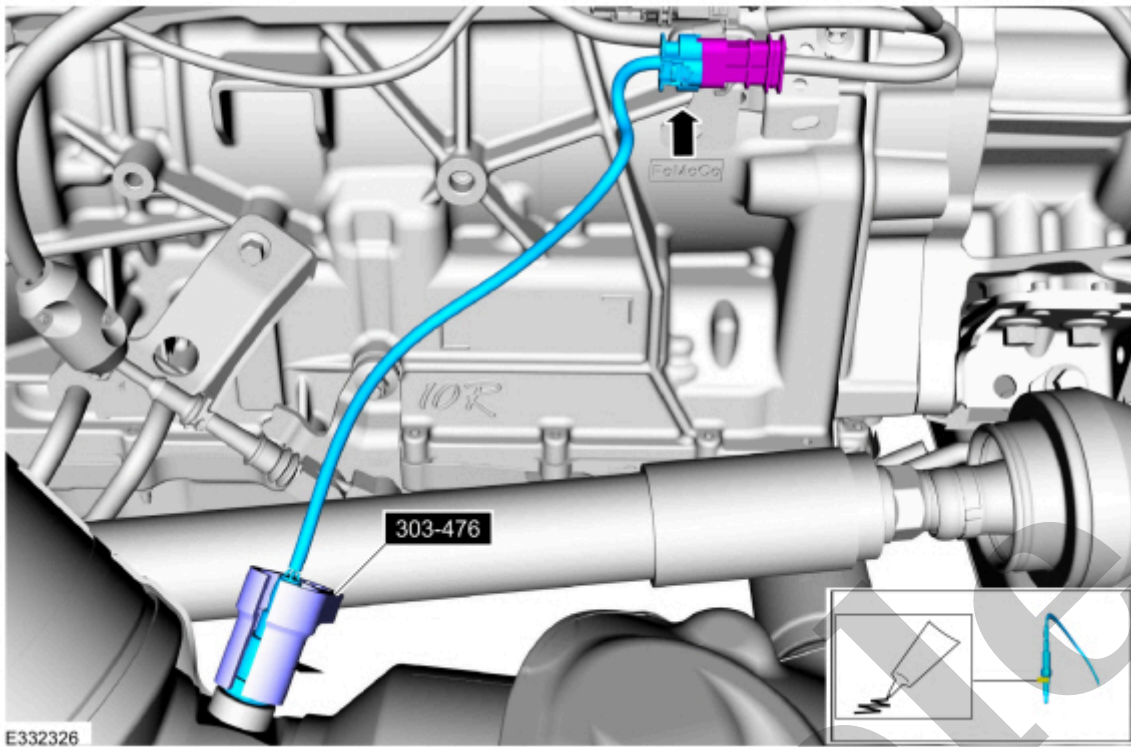
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### Catalyst Monitor Bank 2 Sensor 1

5. Disconnect the electrical connector. Apply penetrating oil to sensor, using the special tool remove the Catalyst monitor sensor.

**Use Special Service Tool :** 303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor

**Material :** Motorcraft® Penetrating and Lock Lubricant / XL-1



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### Catalyst Monitor Bank 1 Sensor 1

2. • Apply anti-seize to thread of sensor, using special tool install the Catalyst monitor sensor. Connect the electrical connector.

**Use Special Service Tool** : 303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor

**Material** : Motorcraft® High Temperature Nickel Anti-Seize Lubricant / XL-2

**Torque** : 35 lb.ft (48 Nm)

- Connect the electrical connector.