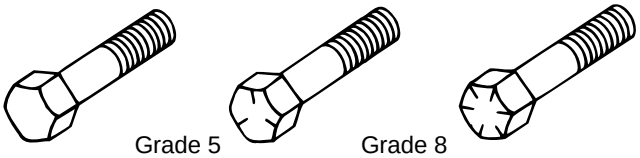
METRICS

BOLT STRENGTH IDENTIFICATION

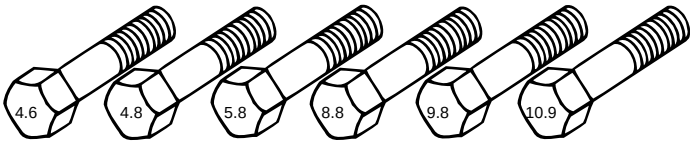
ENGLISH SYSTEM



Grade 1 or 2 Grade 5 Grade 8

English bolts: Identification marks on the bolt head represent Rockwell hardness. Generally, the bolt's grade is equal to the number of marks plus two. The higher the grade, the stronger the bolt.

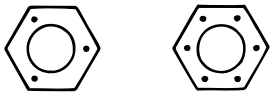
METRIC SYSTEM



Metric bolts: Identification class numbers on bolt heads represent tensile strength. Higher numbers indicate stronger bolts. Common metric fastener bolt strength properties are 9.8 and 10.9.

HEX NUT STRENGTH IDENTIFICATION

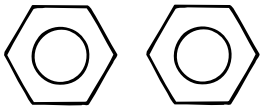
ENGLISH SYSTEM



Grade 5 Grade 8

Identification dots represent Rockwell hardness. The nut's grade is equal to the number of dots plus two. The higher the grade, the stronger the nut.

METRIC SYSTEM

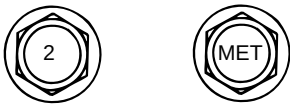


Identification class numbers on nuts represent tensile strength. Higher numbers indicate stronger nuts. Nuts may also have blue finish or paint daub on hex flat.

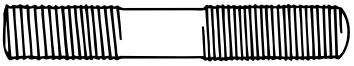
OTHER TYPES OF PARTS

Metric identification schemes vary by type of part, most often a variation of that used for bolts and nuts. Note that many types of English and Metric fasteners carry no special identification if they are otherwise unique.

–Stamped U-Nuts



–Tapping, thread forming and certain other case hardened screws.



CLASS 10.9 CLASS 9.8 CLASS 8.8

–Studs, Large studs may carry the property class number. Smaller studs use a geometric code on the end.

Revision 1, 8/10/2000

REFER to: Front Wheel Bearing and Wheel Hub (204-01 Front Suspension, Removal and Installation).

2. **NOTE:** *In order to obtain accurate measurements, the suspension must be in full rebound with the weight of the vehicle supported by the frame.*

   Raise and support the vehicle by the frame to allow the wheels to hang in the rebound position.
   REFER to: Jacking and Lifting - Overview (100-02 Jacking and Lifting, Description and Operation).

3. Inspect the ball joint and ball joint boot for damage.
   - If the ball joint or ball joint boot is damaged, install a new lower control arm as necessary.
     REFER to: Lower Arm (204-01 Front Suspension, Removal and Installation).

NOTE: *Carry out Steps 4 through 6 to inspect the lower ball joint.*

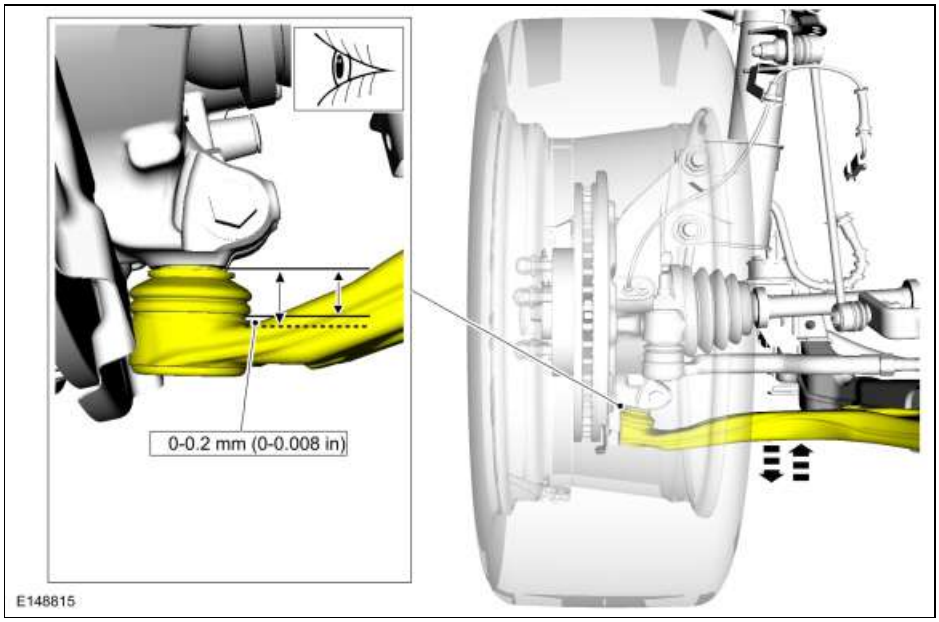
4. **NOTICE: Do not use any tools or equipment to move the wheel and tire assembly or suspension components while checking for relative movement. Suspension damage may occur. The use of tools or equipment will also create relative movement that may not exist when using hand force. Relative movement must be measured using hand force only.**

   NOTE: *The weight of the wheel and tire assembly must be overcome to obtain an accurate measurement on the dial indicator.*

   Inspect the ball joint for relative movement by alternately pulling downward and pushing upward on the lower control arm by hand. Note any relative vertical movement between the wheel knuckle and lower control arm at the lower ball joint.
   - If relative movement is not felt or seen, the ball joint is OK. Do not install a new lower control arm.
   - If relative movement is found, continue with Step 5.

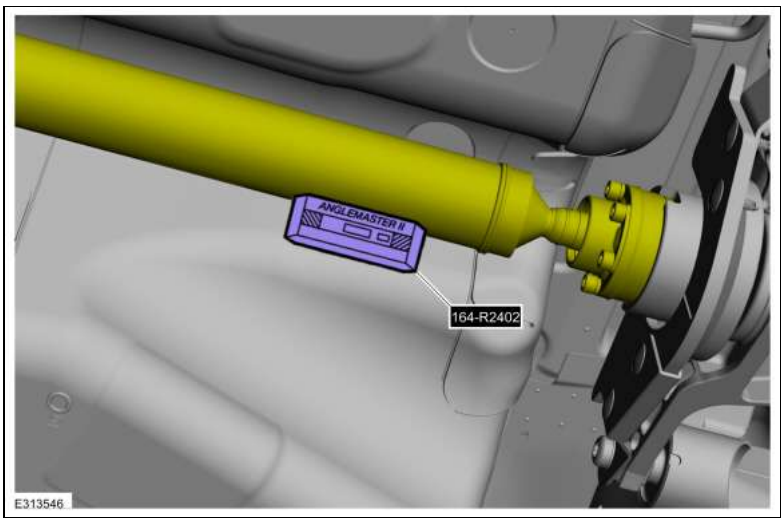
5. **NOTE:** *In order to obtain an accurate measurement, the dial indicator should be aligned as close as possible with the vertical axis (center line) of the ball joint.*

   To measure ball joint deflection, attach a suitable dial indicator with a flexible arm between the lower control arm and the wheel knuckle or ball joint stud.



6. Measure the ball joint deflection while an assistant pushes up and pulls down on the lower control arm, by hand.
   - If the deflection exceeds the specification, a new lower control arm must be installed.
     REFER to: Lower Arm (204-01 Front Suspension, Removal and Installation).

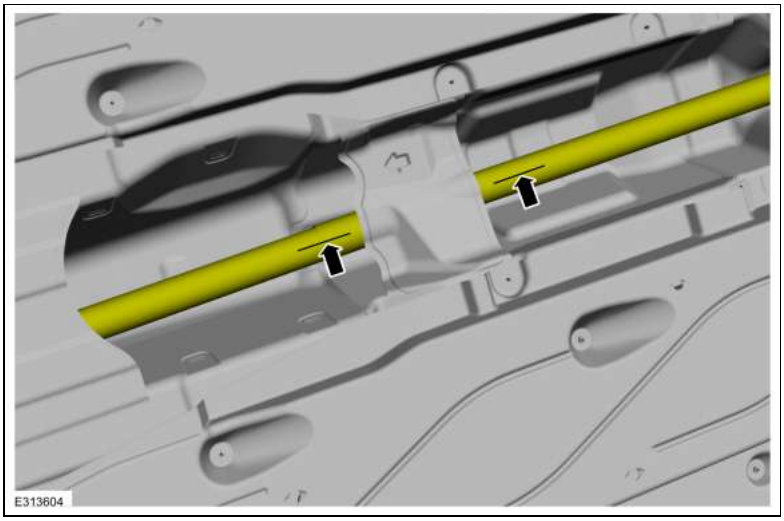
   - If the deflection meets the specification, no further action is required.



8. **NOTE:** *Repeat this step for each center support bearing on the driveshaft.*

   NOTE: *It is not necessary to remove the U-joint snap ring, if equipped, for these measurements.*

   Special Tool(s): Anglemaster II Driveline Inclinometer/Protractor 164-R2402. Measure the slope of the components in front and behind the center support bearing U-joint in the area indicated. Record the front component as angle A and the rear component as angle B.



9. **NOTE:** *When 2 connected components slope in the same direction, subtract the smallest number from the larger number to find the U-joint operating angle. When 2 connected components slope in the opposite direction, add the measurements to find the U-joint operating angle.*

   Calculate the difference in the slope of the components to determine the U-joint operating angle.

10. **NOTE:**

    - *The U-joint operating angle is the angle formed by 2 yokes connected by a cross and bearing kit. Ideally, the operating angles on each connection of the driveshaft must:*

    1. be equal or within one degree of each other.
    2. have a 3 degree maximum operating angle.
    3. have at least one-half of one degree continuous operating angle.

11. If the angle is not within specifications, repair or adjust to obtain the correct angle. Inspect the engine mounts, transmission mounts, center support bearing mounting, rear

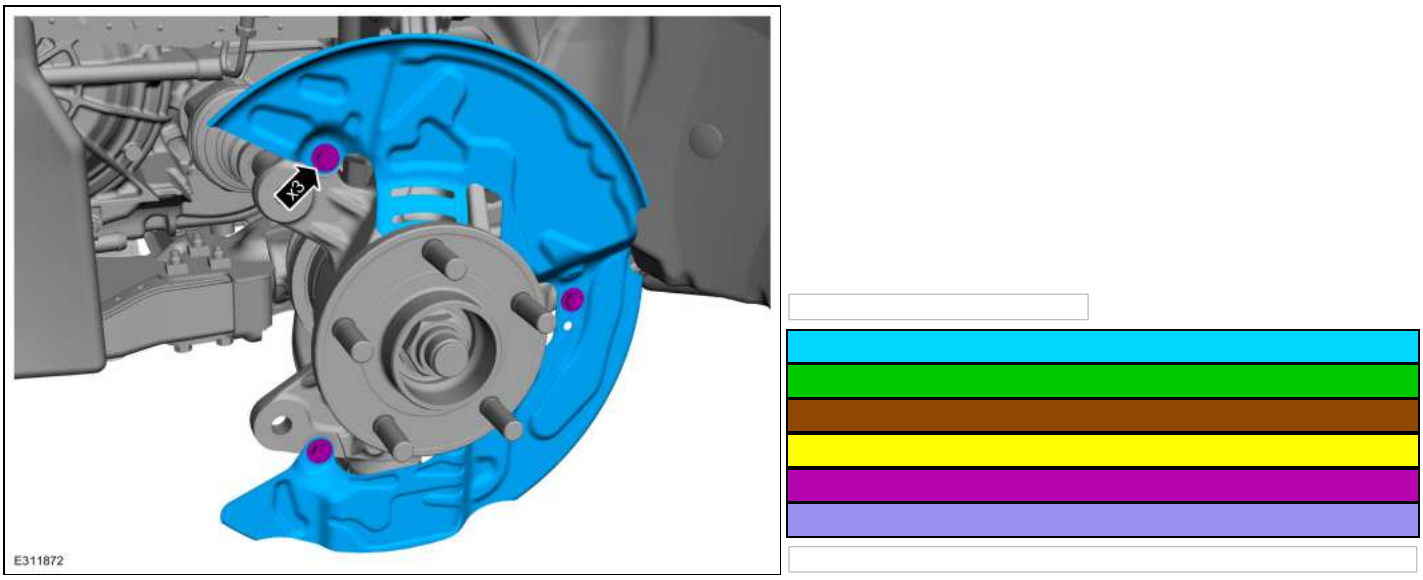
Brake Disc Shield

Removal

NOTE: *Removal steps in this procedure may contain installation details.*

1. Remove the brake disc.
   Refer to: Brake Disc (206-03 Front Disc Brake, Removal and Installation).

2. Remove the bolts and brake disc.
   Torque: 80 lb.in (9 Nm)



Installation

1. To install, reverse the removal procedure.

PINPOINT TEST H : NO POWER IN ON - PUSH BUTTON IGNITION SWITCH

Refer to Wiring Diagrams Cell 13 for schematic and connector information.

Refer to Wiring Diagrams Cell 20 for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Steering Wheel and Column Electrical Components - System Operation and Component Description (211-05 Steering Wheel and Column Electrical Components, Description and Operation).

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
PCM P2534:00	Ignition Switch On/Start Position Circuit Low: No Sub Type Information	This DTC sets if the PCM detects a low voltage signal from the ignition switch input circuits.
PCM P2535:00	Ignition Switch On/Start Position Circuit High: No Sub Type Information	This DTC sets if the PCM detects a high voltage signal from the ignition switch input circuits.
BCM B108A:01	Start Button: General Electrical Failure	Sets continuous when the BCM detects a fault from one of the ignition switch input circuits.
BCM B108A:24	Start Button: Signal Stuck High	Sets continuous when the BCM detects a fault from one of the ignition switch input circuits.
BCM B1142:29	Ignition Status 1: Signal Invalid	Sets during the on-demand self-test when the BCM detects a fault from one of the ignition switch input circuits.
BCM B1310:12	Run/Start Control: Circuit Short To Battery	Sets when the BCM detects a short to voltage on the BJB run/start relay control circuit. When set, the control side of the run/start relay is disabled via the Field Effect Transistor (FET) in the BCM. Once the condition that caused the DTC to set is repaired, the BCM must pass a self-test in order for the DTC to clear and the system to resume normal operation.
BCM B1310:14	Run/Start Control: Circuit Short To Ground Or Open	The BCM continuously monitors the control side of the run/start relay in the BJB. This DTC is set if the BCM detects an open or a short to ground on the control side of the run/start relay. When this DTC sets, the BCM disables the control side of the RUN/START relay FET. Once the condition that caused the DTC to set is repaired, the BCM must pass a self-test in order for the DTC to clear and the system to resume normal operation.

Possible Sources

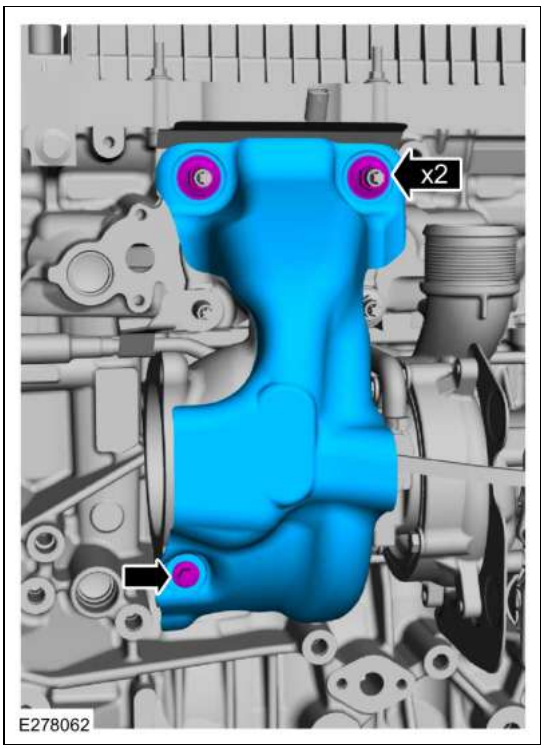
- Battery voltage concern
- Fuse
- Wiring, terminals or connectors
- PATS concern
- Push button ignition switch
- BCM

Visual Inspection and Pre-checks

- Inspect the battery and battery cables.
- Inspect the BCM fuse 4 (10A).

NOTICE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

H1 CHECK THE VEHICLE BATTERY



51. Remove the bolts and discard the cylinder block-to-turbocharger oil supply pipe.

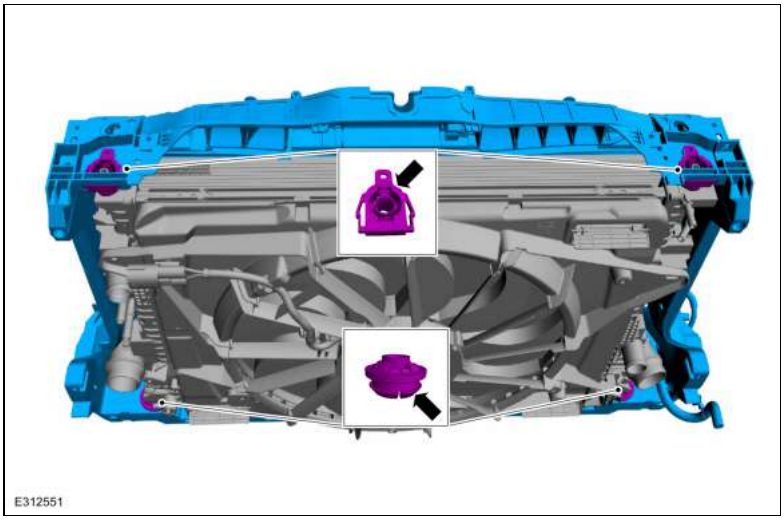
Radiator

Removal

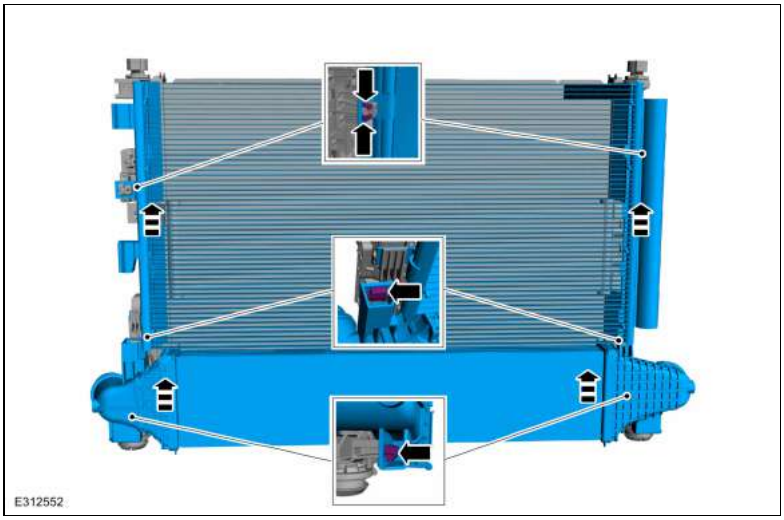
NOTE: *Removal steps in this procedure may contain installation details.*

1. Remove the cooling module.
   Refer to: Cooling Module (303-03B Engine Cooling - 2.0L EcoBoost (177kW/240PS) â€“ MI4, Removal and Installation).

2. Release the clips and remove the front end bolster module.



3.
   - Release the tabs and remove the A/C condenser.
   - Release the tabs and remove the CAC.



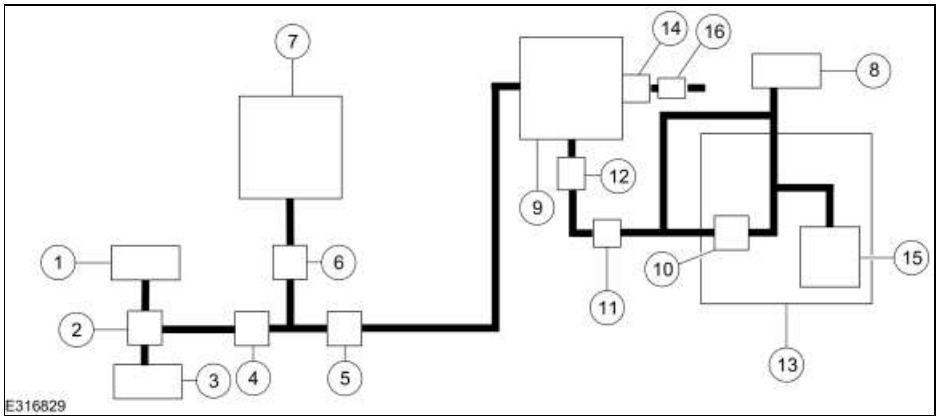
4. Release the tabs and remove the transmission oil cooler.

Evaporative Emissions - System Operation and Component Description

System Operation

Refer to the PC/ED manual section 1 Description and Operation.

System Diagram



Item	Description
1	Air Cleaner (ACL) outlet pipe
2	Vapor ejector
3	Turbocharger to CAC (Charge Air Cooler) tube
4	Check valve
5	EVAP (Evaporative Emission) canister purge valve
6	Check valve
7	Intake manifold
8	Fuel tank filler pipe
9	EVAP canister
10	Fuel vapor vent valve
11	Fuel Tank Pressure (FTP) sensor and tube
12	EVAP blocking valve
13	Fuel tank
14	EVAP canister inlet filter
15	Fuel level sensor
16	EVAP canister vent solenoid

- Ignition ON.
- Using a diagnostic scan tool, clear the DTC for the PCM.
- Road test the vehicle.
- Using a diagnostic scan tool, carry out the PCM self-test.

Are DTCs P0752, P0757, P0762, P0767, P0772, P2708, P2758 present in the PCM?

Yes	DTC P0752, A clutch Always Applied symptom, REFER to: A Clutch (307-01A Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F35/8F40, Diagnosis and Testing). DTC P0757, B clutch Always Applied symptom, REFER to: B Clutch (307-01A Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F35/8F40, Diagnosis and Testing). DTC P0762, C clutch Always Applied symptom, REFER to: C Clutch (307-01A Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F35/8F40, Diagnosis and Testing). DTC P0767, D clutch Always Applied symptom, REFER to: Hydraulic Selectable One-Way Clutch Assembly (307-01A Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F35/8F40, Diagnosis and Testing). DTC P0772, E clutch Always Applied symptom, REFER to: E Clutch (307-01A Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F35/8F40, Diagnosis and Testing). DTC P2708, F clutch Always Applied symptom, REFER to: F Clutch (307-01A Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F35/8F40, Diagnosis and Testing). DTC P2758, TCC Always Applied symptom, REFER to: Torque Converter Clutch (TCC) (307-01A Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F35/8F40, Diagnosis and Testing).
No	The fault is not present at this time and may be intermittent.

PINPOINT TEST Z : DTC P0868

Normal Operation and Fault Conditions

The PCM monitors the transmission fluid pressure at all times to ensure proper transmission operation. It sets a DTC if it detects low pressure.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
PCM P0868:00	Transmission Fluid Pressure Low: No Sub Type Information	The PCM detected multiple clutch stuck off DTCs. This DTC may set in conjunction with P0751, P0756, P0761, P0766, P0771 or P2707. The DTC self clears after 40 warm up cycles have been completed without detecting the fault again.
PCM P0869:00	Transmission Fluid Pressure High: No Sub Type Information	The PCM received a high reading from the clutch B pressure sensor on 2 key cycles. When this DTC sets, the failsafe logic disables 4th and 6th gears and limits RPM in R. The DTC self clears after 40 warm up cycles have been completed without detecting the fault again.

Possible Sources

- Transmission fluid contamination
- Pump failure

Z1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

- Measure:

HF45 TRANSMISSION

Positive Lead	Measurement / Action	Negative Lead
C1111-19	Ω	C1111-1
C1111-19	Ω	C1111-8
C1111-19	Ω	C1111-11
C1111-19	Ω	C1111-14
C1111-19	Ω	C1111-15
C1111-19	Ω	C1111-18
C1111-19	Ω	C1111-28
C1111-19	Ω	C1111-29
C1111-19	Ω	C1111-30
C1111-19	Ω	C1111-34
C1111-19	Ω	C1111-35
C1111-19	Ω	C1111-38
C1111-19	Ω	C1111-39
C1111-19	Ω	C1111-40

Are the resistances greater than 10,000 ohms?

Yes	GO to E8
No	REPAIR the circuit.

E8 CHECK THE TRANSMISSION INTERNAL HARNESS PARK SOLENOID POWER CIRCUIT FOR AN OPEN

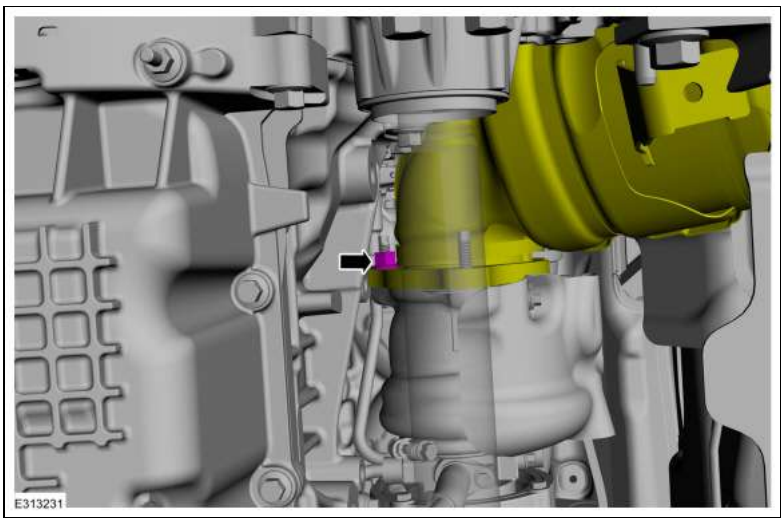
External Controls

Diagnostic Trouble Code (DTC) Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Diagnostic Trouble Code Chart

Module	DTC	Description	Action **New:** *hover over Pinpoint Test links to show title*
GSM	P0562:00	System Voltage Low: No Sub Type Information	GO to Pinpoint Test A
GSM	P0563:00	System Voltage High: No Sub Type Information	GO to Pinpoint Test B
GSM	P0605:00	Internal Control Module Read Only Memory (ROM) Error: No Sub Type Information	GO to Pinpoint Test L
GSM	P0606:00	Control Module Processor: No Sub Type Information	GO to Pinpoint Test L
GSM	P0607:00	Control Module Performance: No Sub Type Information	GO to Pinpoint Test L
GSM	P06B8:00	Internal Control Module Non-Volatile Random Access Memory (NVRAM) Error: No Sub Type Information	GO to Pinpoint Test L
GSM	P07EC:00	Transmission Range Multi-Function Select Circuit: No Sub Type Information	GO to Pinpoint Test J
GSM	P07ED:00	Transmission Range Multi-Function Select Circuit Stuck: No Sub Type Information	GO to Pinpoint Test J
GSM	P0814:00	Transmission Range Display Circuit: No sub Type Information	GO to Pinpoint Test I
GSM	P0915:00	Gear Shift Position Circuit Range/Performance: No sub Type Information	GO to Pinpoint Test I
GSM	P0919:00	Gear Shift Position Control Error: No Sub Type Information	GO to Pinpoint Test G
GSM	P0919:77	Gear Shift Position Control Error: Commanded Position Not Reachable	GO to Pinpoint Test G
GSM	P0929:00	Gear Shift Lock Solenoid/Actuator Circuit "A" Range/Performance: No Sub Type Information	GO to Pinpoint Test G
GSM	P0929:77	Gear Shift Lock Solenoid/Actuator Circuit "A" Range/Performance: Commanded Position Not Reachable	GO to Pinpoint Test G
GSM	P164E:00	Internal Control Module Transmission Range Select Performance: No Sub Type Information	GO to Pinpoint Test L
GSM	P166B:00	Drivers Door Status Correlation: No Sub Type Information	GO to Pinpoint Test H
GSM	P1753:00	Gear Shift Position Sensor Alignment: No Sub Type Information	GO to Pinpoint Test G
GSM	U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	GO to Pinpoint Test F
GSM	U0100:87	Lost Communication With ECM/PCM "A": Missing Message	GO to Pinpoint Test F
GSM	U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	GO to Pinpoint Test E
GSM	U0140:00	Lost Communication With Body Control Module: Missing Message: No Sub Type information	GO to Pinpoint Test D
GSM	U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type information	GO to Pinpoint Test C
GSM	U0301:00	Software Incompatibility with ECM/PCM: No Sub Type Information	GO to Pinpoint Test M
GSM	U0401:00	Invalid Data Received from ECM/PCM A: No Sub Type Information	GO to Pinpoint Test F



16. The nuts are only finger tight at this step.
    Install the catalytic converter flange nuts.

17.
    1. Install the lower bracket nut.
       Torque: 35 lb.ft (47.5 Nm)
    2. Install the PIA nut.
       Torque: 35 lb.ft (47.5 Nm)

NOTE: *Static refrigerant pressure, under perfect conditions, should approximately reflect ambient air temperature. Do not rely upon the static refrigerant pressure alone to determine if the system is properly charged. Refer to the current Ford Web Based Technical Training courses for basic HVAC system refrigerant operation.*

- Ignition OFF.
- With a manifold gauge set connected, check for minimum A/C system pressure.

Is the A/C system pressure above 290 kPa (42 psi)?

Yes	GO to K2
No	CHECK the A/C system for leaks. REFER to the appropriate General Procedures in Group 412-00. After leak is repaired, RECHARGE the A/C system. REFER to the appropriate General Procedure in Group 412-00.

K2 CHECK THE COMMUNICATION NETWORK

- Ignition ON.
- Using a diagnostic scan tool, carry out the network test.

Do the HVAC control module and the PCM pass the network test?

Yes	GO to K3
No	DIAGNOSE the HVAC control module or PCM does not communicate with the diagnostic scan tool. REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).

K3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) PRESSURE SENSOR (ACP_PRESS) PID (PARAMETER IDENTIFICATION)

NOTE: *The following pinpoint test step is tested in ambient temperature of approximately 21.1Â°C (70Â°F). As ambient temperatures near 38Â°C (100.4Â°F), the pressure value difference increases above Â± 15 psi (103 kPa) range.*

- Ignition OFF.
- Connect a manifold gauge set.
- Ignition ON.
- With a manifold gauge set connected, compare the pressure readings of the manifold gauge set and the

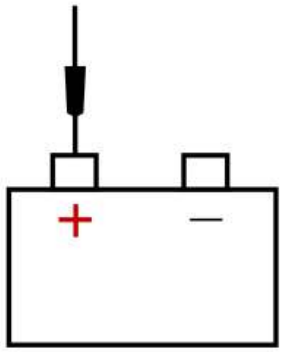
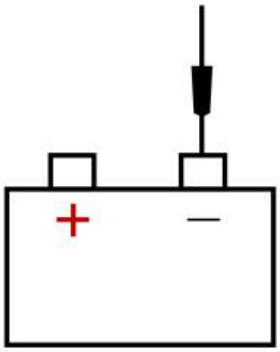
  Access the PCM and monitor the ACP_PRESS (kPa) PID

Are the pressure values of the manifold gauge set and the ACP_PRESS PCM PID, dependent upon ambient temperatures, within Â± 103 kPa (15 psi)?

Yes	GO to K4
No	DIAGNOSE the A/C pressure transducer. GO to Pinpoint Test A

K4 COMPARE THE HVAC (HEATING, VENTILATION AND AIR CONDITIONING) CONTROL MODULE EVAPORATOR TEMPERATURE (EVAP_TEMP) PID (PARAMETER IDENTIFICATION) TO THE PCM (POWERTRAIN CONTROL MODULE) AMBIENT AIR TEMPERATURE (AAT) PID (PARAMETER IDENTIFICATION)

- Using a diagnostic scan tool, view the PCM GENVDSD PID.
- Using a diagnostic scan tool active command, set the PCM PID GENVDSD to 14 volts.
- With the engine still running at idle, measure battery and record:

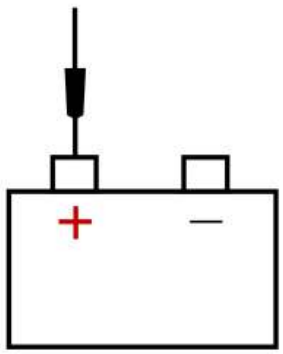
Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Is the recorded battery voltage within Â±0.5 volt of the PID?

Yes	GO to A6
No	INSTALL a new generator. REFER to: Generator - 2.0L EcoBoost (177kW/240PS) â€“ MI4 (414-02 Generator and Regulator, Removal and Installation).

A6 CHECK THE GENERATOR OUTPUT

- Increase the engine rpm until the generator starts to generate output.
- With the engine running, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		Ground

Is the voltage above 15.2 volts?

Yes	INSTALL a new generator. REFER to: Generator - 2.0L EcoBoost (177kW/240PS) â€“ MI4 (414-02 Generator and Regulator, Removal and Installation).
No	GO to A7

Refer to Wiring Diagrams Cell 85 for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - Overview (417-01 Exterior Lighting, Description and Operation).
REFER to: Exterior Lighting - System Operation and Component Description (417-01 Exterior Lighting, Description and Operation).

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
HCM B1041:04	Levelling Control: System Internal Failures	A continuous memory and on-demand DTC that sets when the HCM detects an invalid input from the left rear height sensor.
HCM B1041:54	Levelling Control: Missing Calibration	A continuous memory and on-demand DTC that sets when the HCM detects an invalid input from the left rear height sensor.
HCM B1A59:1C	Sensor 5 Volt Supply: Circuit Voltage Out Of Range	A continuous memory and on-demand DTC that sets when the HCM detects that the 5 volt reference to the height sensors is lower than 4.75 volts or greater than 5.25 volts.
HCM C1A03:12	Left Front Height Sensor: Circuit Short To Battery	A continuous memory and on-demand DTC that sets when the HCM detects a short to voltage from the front headlamp leveling sensor feedback circuit.
HCM C1A03:14	Left Front Height Sensor: Circuit Short To Ground Or Open	A continuous memory and on-demand DTC that sets when the HCM detects an open or short to ground from the front headlamp leveling sensor feedback circuit.
HCM C1A03:29	Left Front Height Sensor: Signal Invalid	A continuous memory and on-demand DTC that sets when the HCM detects a from the front headlamp leveling sensor feedback signal that is not consistent with vehicle operation, such as vehicle acceleration without signal change.
HCM C1A03:64	Left Front Height Sensor: Signal Plausibility Failure	A continuous memory and on-demand DTC that sets when the HCM detects a from the front headlamp leveling sensor feedback signal that is not consistent with vehicle operation, such as vehicle acceleration without signal change. .
HCM C1A05:12	Left Rear Height Sensor: Circuit Short To Battery	A continuous memory and on-demand DTC that sets when the HCM detects a short to voltage from the rear headlamp leveling sensor feedback circuit.
HCM C1A05:14	Left Rear Height Sensor: Circuit Short To Ground Or Open	A continuous memory and on-demand DTC that sets when the HCM detects an open or short to ground from the rear headlamp leveling sensor feedback circuit.
HCM C1A05:29	Left Rear Height Sensor: Signal Invalid	A continuous memory and on-demand DTC that sets when the HCM detects a from the rear headlamp leveling sensor feedback signal that is not consistent with vehicle operation, such as vehicle acceleration without signal change.
HCM C1A05:64	Left Rear Height Sensor: Signal Plausibility Failure	A continuous memory and on-demand DTC that sets when the HCM detects a from the rear headlamp leveling sensor feedback signal that is not consistent with vehicle operation, such as vehicle acceleration without signal change.

Possible Sources

- Wiring, terminals or connectors
- Headlamp leveling sensor
- HCM

Visual Inspection and Pre-checks

- Inspect the headlamp leveling sensors and linkage for damage.

I1 CHECK FOR SUPPLY VOLTAGE TO THE HEADLAMP LEVELING SENSOR