General Specifications

Item	Specification
Spark plug	AYFS-32Y-R
Spark plug gap	1.25-1.35 mm (0.049-0.053 in)

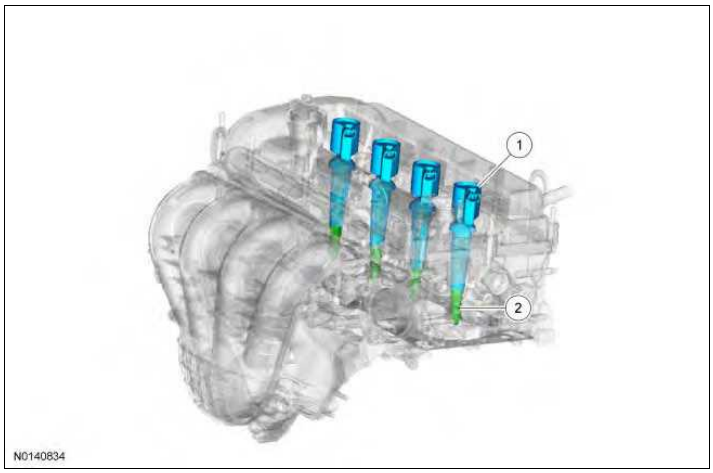
Torque Specifications

Description	Nm	lb-in
Ignition coil bolts	8	71
Spark plugs	12	10

Engine Ignition

Component Location

2.5L



Item	Description	Comments
1	Ignition coil-on-plug(s)	-
2	Spark plug(s)	-

System Operation

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

Componenscription

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

Ignition Coil-On-Plug

Material

Item	Specification
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A

Removal and Installation

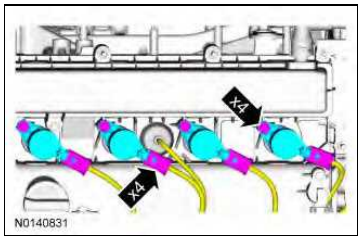
NOTE: Removal steps in this procedure may contain installation details.

1. **NOTE:** Use compressed air to remove any foreign material from the ignition coil-on-plugs and surrounding area before removing the ignition coil-on-plugs.

   NOTE: When removing the ignition coil-on-plugs, a slight twisting motion will break the seal and ease removal.

   NOTE: When installing apply a small amount of dielectric grease to the inside of the ignition coil boots before attaching to the spark plugs.

   Tighten to 8 Nm (71 lb-in).



2. Visual check. Inspect the ignition coil-on-plug rubber boot for cracks, rips or tears. Replace any damaged coil-on-plug rubber boots.

3. To install, reverse the removal procedure.

Spark Plugs

Removal and Installation

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

1. Remove the 4 ignition coil-on-plugs. Refer to Ignition Coil-On-Plug .

2. ***NOTICE:*** **Only use hand tools when removing or installing the spark plugs, or damage can occur to the cylinder head or spark plug.**

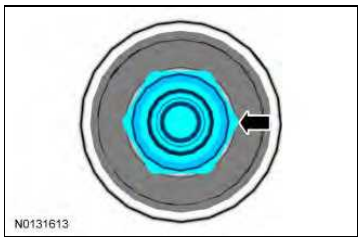
   NOTICE: **The spark plug procedure must be followed exactly or damage to the cylinder head and spark plug will result.**

   NOTICE: **Do not remove the spark plugs when the engine is hot or cold soaked. Spark plug thread or cylinder head damage can occur. Make sure the engine is warm (hand touch after cooling down) prior to spark plug removal.**

   NOTICE: **The spark plug must be positively located in any assembly aid or tool to prevent the spark plug from falling into the spark plug location, or damage can occur to the cylinder head or to the spark plu**

   NOTE: Use compressed air to remove any foreign material in the spark plug well before removing the spark plugs.

   Tighten to 12 Nm (106 lb-in).



3. To install, reverse the removal procedure.

Communications Network

Overview

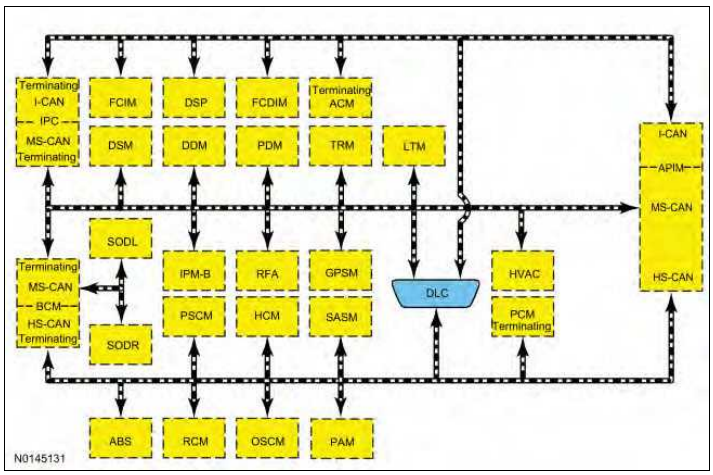
Multiplexing is a method of sending 2 or more signals simultaneously over a single circuit. Multiplexing is used to allow 2 or more electronic modules (nodes) to communicate simultaneously over a twisted-wire pair [data (+) and data (-)] network. The information or messages that can be communicated on these wires consists of commands, status or data. The advantage of using multiplexing is to reduce the weight of the vehicle by reducing the number of redundant components and electrical wiring.

The vehicle has 3 module communication networks which are connected to the Data Link Connector (DLC), and are located under the instrument panel:

- High Speed Controller Area Network (HS-CAN)
- Medium Speed Controller Area Network (MS-CAN)
- Infotainment Controller Area Network (I-CAN)

System Operation

System Diagram



Module Network Chart

Module Name	Network Type	Termination Module
ABS module	HS-CAN	No
Accessory Protocol Interface Module (APIM)	HS-CAN	No
	I-CAN	No
Accessory Protocol Interface Module (APIM) (8-inch touchscreen) (if equipped)	HS-CAN	No
	MS-CAN	No
	I-CAN	No

Audio Front Control Module (ACM)	I-CAN	Yes
Audio Digital Signal Processing (DSP) module (if equipped)	I-CAN	No
Body Control Module (BCM)	HS-CAN	Yes
	MS-CAN	Yes
HVAC module	MS-CAN	No
Driver Door Module (DDM) (if equipped)	MS-CAN	No
Driver Seat Module (DSM) (if equipped)	MS-CAN	No
Front Controls Interface Module (FCIM)	I-CAN	No
Front Control/Display Interface Module (FCDIM)	I-CAN	No
Global Positioning System Module (GPSM) (if equipped)	MS-CAN	No
Headlamp Control Module (HCM) (if equipped)	MS-CAN	No
Image Processing Module - B (IPM-B) (if equipped)	MS-CAN	No
Instrument Panel Cluster (IPC) (gateway module)	MS-CAN	Yes
	I-CAN	Yes
Liftgate/Trunk Module (LTM)	MS-CAN	No
Occupant Classification System Module (OCSM)	HS-CAN	No
Parking Aid Module (PAM) (if equipped)	HS-CAN	No
Passenger Door Module (PDM)	MS-CAN	No
PCM	HS-CAN	Yes
Power Steering Control Module (PSCM)	HS-CAN	No
Remote Function Actuator (RFA) module (if equipped)	MS-CAN	No
Restraints Control Module (RCM)	HS-CAN	No
Steering Angle Sensor Module (SASM)	HS-CAN	No
Side Obstacle Detection Control Module - Left (SOD-L) (if equipped)	MS-CAN	No
Side Obstacle Detection Control Module - Right (SOD-R) (if equipped)	MS-CAN	No
Trailer Module (TRM) (if equipped)	MS-CAN	No

Network Termination

The Controller Area Network (CAN) uses network termination to improve communication reliability. Termination modules are located at both ends of the network. As network messages are broadcast in the form of voltage signals, the network voltage signals are stabilized by the termination resistors.

Each termination module has an internal 120 ohm resistor that bridges across the positive and negative bus connection. With two 120 ohm resistors located in a parallel circuit configuration, the total network impedance, or total resistance, is 60 ohms.

Network termination improves bus message reliability by:

- stabilizing bus voltage.
- eliminating electrical interference.

Gateway Module

The Body Control Module (BCM) and Instrument Panel Cluster (IPC) are the gateway modules.

The BCM translates messages on the HS-CAN to the MS-CAN and vice versa. The IPC translates messages on the MS-CAN to the I-CAN and vice versa.

This allows a message to be distributed through all three networks. The BCM and IPC are the only modules on this vehicle that have this ability.

High Speed Controller Area Network (HS-CAN)

The HS-CAN operates at a maximum data transfer speed of 500 Kbps and is designed for real time powertrain information transfer and control.

Modules on the HS-CAN communicate using bussed messages. The HS-CAN uses an unshielded twisted pair cable, data bus (+) and data bus (-) circuits. In addition to scan tool communication, the HS-CAN allows sharing of information between all modules on the network.

Medium Speed Controller Area Network (MS-CAN)

The MS-CAN operates at a maximum data transfer speed of 125 Kbps and is designed for general information transfer.

Modules on the MS-CAN communicate using bussed messages. The MS-CAN uses an unshielded twisted pair cable, data bus (+) and data bus (-) circuits. In addition to scan tool communication, the MS-CAN allows sharing of information between all modules on the network.

Infotainment Controller Area Network (I-CAN)

The I-CAN operates at a maximum data transfer speed of 500 Kbps and is designed for real time audio and multimedia information transfer and control.

Modules on the I-CAN communicate using bussed messages. I-CAN uses an unshielded twisted pair cable, data bus (+) and data bus (-) circuits. The I-CAN allows sharing of information between all modules on the network.

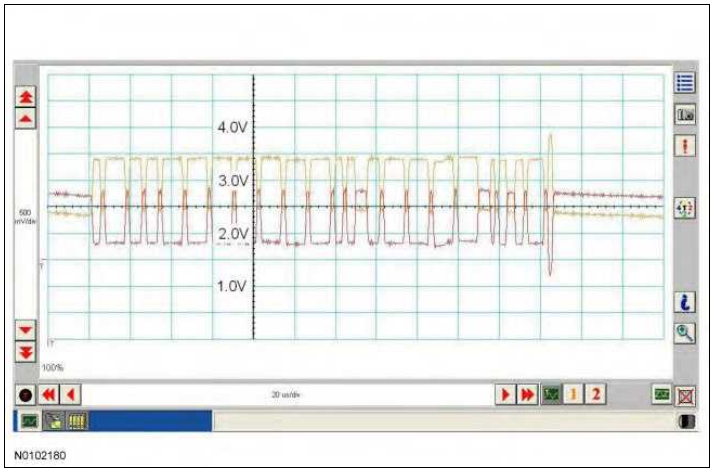
The IPC is used as a gateway module for the messages to transfer between the scan tool and the modules on the I-CAN .

Controller Area Network (CAN) Fault Tolerance

NOTE: The oscilloscope traces below are from the Integrated Diagnostic System (IDS) oscilloscope taken using the IDS pre-configured CAN settings. The traces are for both data (+) and data (-) taken simultaneously (2-channel) at a sample rate of 1 mega-sample per second (1MS/s) or greater.

Traces below are viewed at 500mV per division (vertical axis) and 20 microseconds (20Î¼s) per division (horizontal axis). Readings taken with a different oscilloscope vary from those shown. Compare any suspect readings to a known good vehicle.

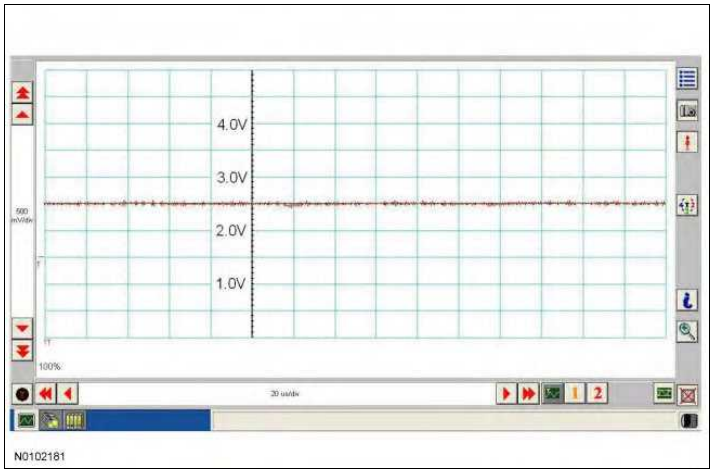
Normal CAN Operation



The data (+) and data (-) circuits are each regulated to approximately 2.5 volts during neutral or rested network traffic. As messages are sent on the data (+) circuit, voltage is increased by approximately 1.0 volt. Inversely, the data (-) circuit is reduced by approximately 1.0 volt when a message is sent.

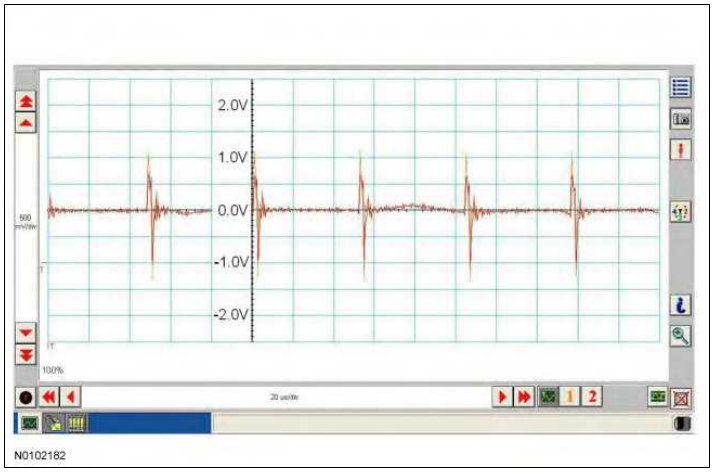
Successful communication of a message can usually be identified by the slight spike at the end of a message transmission. Any signals that are significantly different than the normal CAN waveform may cause network DTCs (U-codes) to set or may cause a complete network outage.

CAN Circuits Shorted Together



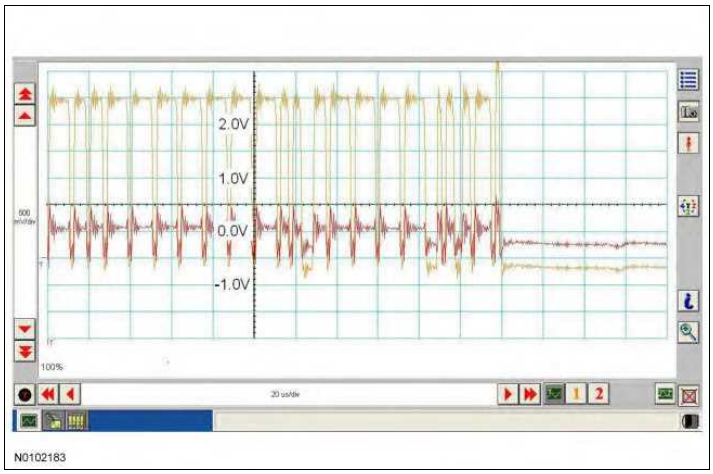
In the event that the data (+) and data (-) circuits become shorted together, the signal stays at base voltage (2.5V) continuously and all communication capabilities are lost.

CAN (+) Circuit Shorted To Ground



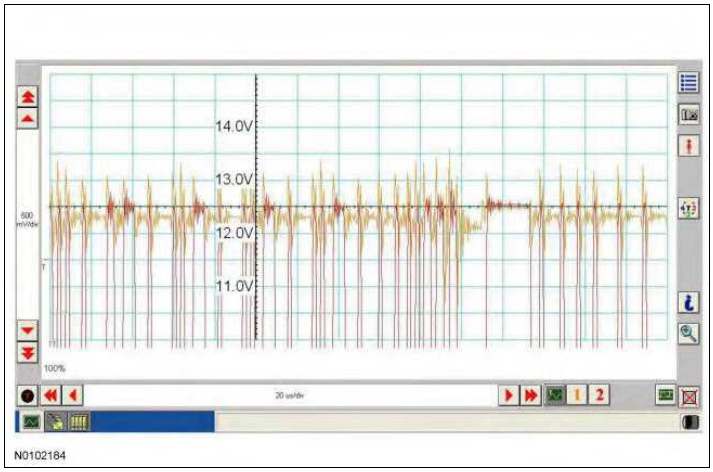
In the event that the data (+) circuit becomes shorted to ground, both the data (+) and data (-) circuits are pulled low (0V) and all communication capabilities are lost.

CAN (-) Circuit Shorted To Ground



In the event that the data (-) circuit becomes shorted to ground, the data (-) circuit is pulled low (0V) and the data (+) circuit reaches near-normal peak voltage (3.0V) during communication but falls to 0V instead of normal base voltage (2.5V). Communication may continue but at a degraded level.

CAN (+) Circuit Shorted To Battery Voltage



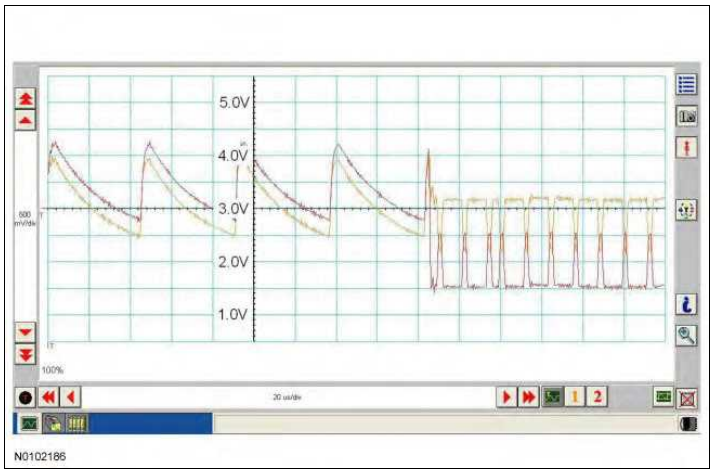
In the event that the data (+) circuit becomes shorted to battery voltage, the data (+) circuit is pulled high

(12V) and the data (-) circuit falls to abnormally high voltage (above 5V) during communication and reaches battery voltage (12V) for peak voltage. Communication may continue but at a degraded level.

CAN (-) Circuit Shorted To Battery Voltage

In the event that the data (-) circuit becomes shorted to battery voltage, both the data (+) and data (-) circuits are pulled high (12V) and all communication capabilities are lost.

CAN Circuit Signal Corruption



Rhythmic oscillations, inductive spikes or random interference can disrupt the network communications. The corruption signal source may be outside electrical interference such as motors or solenoids or internal interference generated from a module on the network. In some cases, an open in either the data (+) or data (-) circuit to a network module may cause the module to emit interference on the one circuit which is still connected. The trace shown is an example of a "sawtooth" pattern transmitted from a module with one open network circuit.

Other corruptions may be present when a module is intermittently powered up and down. The module on power up may initiate communication out of sync with other modules on the network causing momentary communication outages.

Controller Area Network (CAN) Multiplex Messages

Modules on the CAN utilize simultaneous communication of 2 or more messages on the same network circuits. The following chart summarizes the messages sent and received on the network.

Communication Message Chart

NOTE: This chart describes the specific HS-CAN , MS-CAN and I-CAN messages broadcast by each module, and the module(s) that receive the message.

Broadcast Message	Originating Module	Network Type	Receiving Module(s)
A/C request	BCM	HS-CAN	• PCM
ABS module active	ABS module	HS-CAN	• PCM • PAM • PSCM • RCM
ABS module warning indicator request	BCM	MS-CAN	• IPC
Accelerator pedal position	PCM	HS-CAN	• ABS module • BCM • HCM • OCSM • RCM
Accelerator pedal position (gateway)	BCM	MS-CAN	• HVAC module • IPC
ACM CD data	ACM	I-CAN	• FCDIM • APIM • IPC
ACM configuration	ACM	I-CAN	• IPC • APIM • FCDIM • Audio DSP module
ACM configuration (gateway)	IPC	MS-CAN	• BCM
ACM configuration (gateway)	BCM	HS-CAN	• PAM
ACM radio function	ACM	I-CAN	• FCDIM • APIM • IPC
ACM status	ACM	I-CAN	• IPC • FCDIM

			• Audio DSP module • APIM
Air ambient temperature	PCM	HS-CAN	• BCM • HCM • PAM
Air ambient temperature (gateway)	BCM	MS-CAN	• IPC • HVAC module
Air ambient temperature filtered actual	BCM	MS-CAN	• IPC • DDM • PDM • LTM
Air bag deployment status	RCM	HS-CAN	• APIM
Air bag indicator status	IPC	MS-CAN	• BCM
Air bag warning indicator status	BCM	HS-CAN	• RCM
Ambient light level	BCM	MS-CAN	• IPC
Ambient light setting	BCM	MS-CAN	• IPC
Audio mute request	BCM	MS-CAN	• IPC
Audio button status	FCIM	I-CAN	• APIM
Audio button status	FCDIM	I-CAN	• APIM
Audio display request mode	FCDIM	I-CAN	• APIM
Audio mode and setting request	FCDIM	I-CAN	• ACM
Audio settings	ACM	I-CAN	• APIM
Audio source request	ACM	I-CAN	• IPC • FCDIM • Audio DSP module • APIM
Audio source select	FCDIM	I-CAN	• APIM
Audio status	APIM	I-CAN	• FCDIM

Audio volume and mode status	Audio DSP module	I-CAN	• APIM • FCDIM
Audio volume command	Audio DSP module	I-CAN	• APIM • FCDIM
AWD service required display	BCM	MS-CAN	• IPC
AWD status	BCM	MS-CAN	• IPC
AWD service required	PCM	HS-CAN	• BCM • RCM
AWD service required (gateway)	BCM	MS-CAN	• IPC
AWD status	PCM	HS-CAN	• BCM • ABS module
AWD lock torque data	PCM	HS-CAN	• BCM
AWD lock torque data (gateway)	BCM	MS-CAN	• IPC
AWD wheel torque data	PCM	HS-CAN	• BCM • ABS module
AWD wheel torque data (gateway)	BCM	MS-CAN	• IPC
Battery charge indicator	BCM	MS-CAN	• IPC
Battery current	BCM	HS-CAN	• PCM
Battery state of charge	IPC	I-CAN	• APIM • FCDIM
Beltminder status	IPC	I-CAN	• ACM • Audio DSP module
Beltminder audio status	Audio DSP module	I-CAN	• APIM • FCDIM
Bezel test status	FCIM	I-CAN	• APIM
Bezel test status	Audio DSP module	I-CAN	• APIM • FCDIM
Bezel test request	FCDIM	I-CAN	• ACM

			• Audio DSP module
BLISÂ® alert	BCM	MS-CAN	• DDM • PDM
BLISÂ® system status	BCM	MS-CAN	• IPC
BLISÂ® status, driver side	DDM	MS-CAN	• BCM
BLISÂ® status, driver side	BCM	MS-CAN	• IPC
BLISÂ® status, passenger side	PDM	MS-CAN	• BCM
BLISÂ® status, passenger side	BCM	MS-CAN	• IPC
Brake fluid level low	BCM	MS-CAN	• IPC
Brake On/Off switch	PCM	HS-CAN	• OCSM • ABS module • HCM • BCM • RCM
Brake pedal applied	PCM	HS-CAN	• BCM
Brake (red) warning indicator request	BCM	MS-CAN	• IPC
Bulb failure indication	BCM	MS-CAN	• IPC
Call data	APIM	I-CAN	• FCDIM
Camera commands	FCDIM	I-CAN	• IPC
Camera commands (gateway)	IPC	MS-CAN	• IPM-B
Camera status display	BCM	MS-CAN	• IPC
Camera status	IPM-B	MS-CAN	• IPC
Car mode	BCM	MS-CAN	• DDM • PDM • HVAC module • IPC • RFA module • LTM

			• TRM
CD changer data	FCDIM	I-CAN	• ACM
CD load/eject	FCDIM	I-CAN	• ACM
Central lock status	BCM	MS-CAN	• RFA module • DDM • IPC • LTM
Charge voltage request	BCM	HS-CAN	• PCM
Charging system indicator request	BCM	MS-CAN	• IPC
Child lock command	BCM	MS-CAN	• DDM • PDM
Chime request	IPC	I-CAN	• ACM • Audio DSP module
Chime request	ACM	I-CAN	• Audio DSP module
Climate control requests	IPC	MS-CAN	• HVAC module
Climate control status	HVAC module	MS-CAN	• IPC
Climate control status (gateway)	IPC	I-CAN	• FCDIM • APIM
Cruise control setting	PCM	HS-CAN	• BCM
Climate control remote start requests	HVAC module	MS-CAN	• IPC
Cross traffic command	IPC	MS-CAN	• BCM
Cross traffic status	BCM	MS-CAN	• IPC
Cruise control status (gateway)	BCM	MS-CAN	• IPC
Date and time	IPC	I-CAN	• APIM • FCDIM
Date and time adjustment request	FCDIM	I-CAN	• IPC

Date and time adjustment request (gateway)	IPC	MS-CAN	• BCM
Day/night status	IPC	I-CAN	• APIM • FCIM
Defrost request	HVAC module	MS-CAN	• BCM
Dimmer switch position	BCM	MS-CAN	• IPC
Display language request	FCDIM	I-CAN	• IPC
Display set volume request	FCDIM	I-CAN	• ACM • Audio DSP module
Door ajar status	IPC	I-CAN	• FCDIM • APIM
Door lock status	IPC	I-CAN	• FCDIM • APIM
Door lock status request	BCM	MS-CAN	• DDM • PDM
Door status	BCM	MS-CAN	• RFA module • DDM • LTM
Door ajar status	BCM	HS-CAN	• ABS module
Driver safety belt status	RCM	HS-CAN	• BCM • PCM
Drivers door latch status	DDM	MS-CAN	• BCM
Drivers window position	DDM	MS-CAN	• BCM • HVAC module
eCall confirmation	APIM	HS-CAN	• RCM • BCM
eCall notification	RCM	HS-CAN	• APIM
Econometer data	PCM	HS-CAN	• BCM
Econometer data (gateway)	BCM	MS-CAN	• IPC

EPAS display	BCM	MS-CAN	• IPC
Emergency braking event	ABS module	HS-CAN	• BCM
Engine coolant temperature	PCM	HS-CAN	• BCM
Engine coolant temperature (gateway)	BCM	MS-CAN	• IPC • HVAC module
Engine coolant temperature fault reporting	BCM	MS-CAN	• IPC
Engine oil life reset	IPC	MS-CAN	• BCM
Engine oil life reset (gateway)	BCM	HS-CAN	• PCM
Engine RPM	PCM	HS-CAN	• BCM • ABS module
Engine RPM (gateway)	BCM	MS-CAN	• IPC • HVAC module • HCM
Engine service indication	PCM	HS-CAN	• BCM
Engine service indication (gateway)	BCM	MS-CAN	• IPC
Engine state	PCM	HS-CAN	• BCM
Evaporator temperature setting	HVAC module	MS-CAN	• BCM
English/metric equivalent	BCM	HS-CAN	• PCM
Exterior light switch position	BCM	HS-CAN	• HCM
FCIM button state	FCIM	I-CAN	• ACM • APIM • Audio DSP module
FCIM button status	FCIM	I-CAN	• APIM
FCDIM configuration	FCDIM	I-CAN	• ACM
Fog lamp indicator request	BCM	MS-CAN	• IPC
Front passenger safety belt buckle status	RCM	HS-CAN	• OCSM

			• BCM
Front washer command	BCM	MS-CAN	• IPC • HVAC module
Fuel level status	BCM	HS-CAN	• PCM
Fuel level status	BCM	MS-CAN	• IPC
Fuel level status (gateway)	IPC	I-CAN	• APIM
Fuel pump cutoff request	RCM	HS-CAN	• BCM
Fuel pump ON/OFF	PCM	HS-CAN	• BCM
Gear lever position	IPC	I-CAN	• ACM • APIM • Audio DSP module • FCDIM
GPS data	GPSM	MS-CAN	• IPC • APIM
Headlamp control status	HCM	HS-CAN	• BCM
Headlamp control status (gateway)	BCM	MS-CAN	• IPC
High beam indicator request	BCM	MS-CAN	• IPC
Hill start assist status	ABS module	HS-CAN	• PCM
Home safe light indication request	BCM	MS-CAN	• IPC
Hood ajar status	BCM	HS-CAN	• ABS module
Ignition key position power mode	IPC	I-CAN	• ACM • APIM • Audio DSP module • FCIM • FCDIM
Ignition key position power mode	BCM	MS-CAN	• RFA module • DDM

			• PDM • DSM • IPC • TRM • IPM-B
Ignition key position power mode	BCM	HS-CAN	• ABS module • PCM • HCM • PAM • PSCM • RCM • SASM
Ignition key type	IPC	MS-CAN	• BCM • RFA module
Ignition key type (gateway)	BCM	HS-CAN	• PAM • ABS module
Ignition status	BCM	MS-CAN	• IPC • GPSM
Ignition status (gateway)	IPC	I-CAN	• APIM • ACM • Audio DSP module • FCIM • FCDIM
Illumination dimming level	IPC	MS-CAN	• BCM • HVAC module
Illumination dimming level	BCM	MS-CAN	• IPC • DDM • PDM • IPM-B
Illumination dimming level (gateway)	IPC	I-CAN	• FCDIM • FCIM • APIM
Illumination dimming level	BCM	HS-CAN	• PCM • PAM • RCM
Intelligent access central lock command	RFA module	MS-CAN	• BCM

			• LTM
Intelligent access indication	BCM	MS-CAN	• IPC
Intelligent access key status	RFA module	MS-CAN	• BCM
Intelligent access system status	RFA module	MS-CAN	• BCM
Key warning indication	BCM	MS-CAN	• IPC
Language display	IPC	I-CAN	• APIM • FCDIM
Left rear window position	DDM	MS-CAN	• BCM • HVAC module
Liftgate ajar status	BCM	HS-CAN	• ABS module
Light switch position	BCM	MS-CAN	• IPC
Load shed level	IPC	I-CAN	• APIM
Main light switch position	BCM	MS-CAN	• IPC
Memory seat position	DSM	MS-CAN	• DDM • PDM • IPC
MIL request	PCM	HS-CAN	• BCM • RCM
MIL request (gateway)	BCM	MS-CAN	• IPC
MyKeyÂ® Identification	BCM	MS-CAN	• IPC
MyKeyÂ® reset request	BCM	MS-CAN	• IPC
Mirror position load request	DSM	MS-CAN	• DDM • PDM
Mirror position store request	DSM	MS-CAN	• DDM • PDM
Multifunction display configuration	FCDIM	I-CAN	• ACM
MyKeyÂ® speed limit configuration	BCM	HS-CAN	• PCM
MyKeyÂ® volume limit status	IPC	I-CAN	

			• Audio DSP module • ACM
MyKeyÂ® volume limit mode	ACM	I-CAN	• APIM • FCDIM
MyKeyÂ® volume limit status	Audio DSP module	I-CAN	• APIM • FCDIM
Navigation data	IPC	I-CAN	• APIM
Navigation request	FCDIM	I-CAN	• ACM
Navigation request audio setting	FCDIM	I-CAN	• ACM • Audio DSP module
Neutral tow status	PCM	HS-CAN	• BCM
Neutral tow status (gateway)	BCM	MS-CAN	• IPC
OCS calibration data	OCSM	HS-CAN	• RCM
OCS fault status	OCSM	HS-CAN	• RCM
OCS sensor data	OCSM	HS-CAN	• RCM
OCS serial number	OCSM	HS-CAN	• RCM
Odometer master value	BCM	HS-CAN	• PCM • ABS module
Odometer master value	IPC	MS-CAN	• DDM • PDM • BCM
Oil change indicator	PCM	HS-CAN	• BCM
Oil pressure warning	PCM	HS-CAN	• BCM
Oil pressure warning (gateway)	BCM	MS-CAN	• IPC
Oil change indicator	BCM	MS-CAN	• IPC
Outer mirror defrost command	BCM	MS-CAN	• DDM • PDM

Outside air temperature status	IPC	I-CAN	• APIM • Audio DSP module • FCIM • FCDIM
Park brake indication	BCM	MS-CAN	• IPC
Parking aid active	PAM	HS-CAN	• BCM
Parking aid active (gateway)	BCM	MS-CAN	• IPC • IPM-B
Parking aid disable status	PAM	HS-CAN	• BCM
Parking aid disable status (gateway)	BCM	MS-CAN	• IPC • IPM-B
Parking aid range to object	PAM	HS-CAN	• BCM
Parking aid range to object (gateway)	BCM	MS-CAN	• IPC • IPM-B
Parking aid rear camera settings	IPC	MS-CAN	• IPM-B
Parking brake actual	BCM	HS-CAN	• ABS module • PCM
PRNDL park position indicator	IPC	MS-CAN	• BCM
Passenger detect status	BCM	MS-CAN	• IPC
Passenger mirror command	DDM	MS-CAN	• PDM
Passenger window command	DDM	MS-CAN	• PDM
Passenger window position	PDM	MS-CAN	• BCM • HVAC module
Passengers door latch status	PDM	MS-CAN	• BCM
Passenger door lock request	PDM	MS-CAN	• BCM
PATS indication	BCM	MS-CAN	• IPC
Passive key out of vehicle	RFA module	MS-CAN	• BCM • IPC

Passive key sensor confirm	BCM	MS-CAN	• RFA module
Passive key liftgate status	RFA module	MS-CAN	• IPC • LTM
Passive key status	BCM	MS-CAN	• IPC
Passive key warning indicator	RFA module	MS-CAN	• BCM • IPC
Passive liftgate release command	LTM	MS-CAN	• RFA module
Passive liftgate request	BCM	MS-CAN	• LTM
Position light indication	BCM	MS-CAN	• TRM • IPC
Parking assist distance sensor data	IPC	I-CAN	• APIM • FCDIM
Parking brake warning	IPC	I-CAN	• APIM
Power pack status	PCM	HS-CAN	• BCM • ABS module
Power system status	BCM	MS-CAN	• IPC
Puddle lamp activation	BCM	MS-CAN	• DDM • PDM
RCM serial number	RCM	HS-CAN	• ABS module
Rear defrost status	BCM	MS-CAN	• HVAC module
Rear door latch status	DDM	MS-CAN	• BCM
Rear passenger safety belt buckle status	RCM	HS-CAN	• BCM
Rear window disable command	DDM	MS-CAN	• PDM • BCM
Restraint impact event status	RCM	HS-CAN	• BCM • OCSM
Reverse gear	BCM	MS-CAN	• DDM

			• PDM • GPSM • IPC • TRM
Remote battery status	BCM	MS-CAN	• IPC
Remote start command	BCM	MS-CAN	• HVAC module
RKE lock command (with intelligent access)	RFA module	MS-CAN	• BCM • DDM • PDM
RKE settings	BCM	MS-CAN	• RFA module
RKE data (with intelligent access)	RFA module	MS-CAN	• BCM
Roll stability control mode	ABS module	HS-CAN	• PSCM
Safety belt status	BCM	MS-CAN	• IPC
Rear view camera display settings	FCDIM	I-CAN	• IPC
Rear view camera status	IPC	I-CAN	• APIM • FCDIM
Satellite radio error status	ACM	I-CAN	• APIM • FCDIM
Satellite radio status	ACM	I-CAN	• APIM • FCDIM
Satellite radio data	ACM	I-CAN	• IPC • FCDIM • APIM
Selected display language	APIM	I-CAN	• IPC
Selected display language (gateway)	IPC	I-CAN	• APIM • FCDIM
Safety belt event status	RCM	HS-CAN	• APIM
Selector lever (PRNDL) status	BCM	MS-CAN	• PDM • DDM • HVAC module • IPC

			• LTM • TRM
Selector lever (PRNDL) status (gateway)	IPC	I-CAN	• APIM • ACM • Audio DSP module • FCDIM
Set point volume	FCIM	I-CAN	• ACM • Audio DSP module
Set volume	FCIM	I-CAN	• ACM • Audio DSP module
Stability control brake active	ABS module	HS-CAN	• PCM • PAM • PSCM • RCM
Stability control mode request	BCM	HS-CAN	• ABS module
Stability-traction control disabled indicator request	ABS module	HS-CAN	• BCM • PCM
Stability-traction control disabled indicator request (gateway)	BCM	MS-CAN	• IPC
Stability-traction control indication	ABS module	HS-CAN	• BCM • RCM
Stability-traction control indication (gateway)	BCM	MS-CAN	• IPC
Stability-traction control disable	IPC	MS-CAN	• BCM
Start/stop button indicator	PCM	HS-CAN	• BCM
Start/stop display message	BCM	MS-CAN	• IPC
Steering angle status	SASM	HS-CAN	• PCM • ABS • BCM • HCM • PAM • PSCM
Steering angle status	BCM	MS-CAN	

			• IPM-B
Steering angle counter	PAM	HS-CAN	• PSCM
Steering wheel switch data	IPC	I-CAN	• ACM
Steering wheel switch data	FCDIM	I-CAN	• APIM
Stoplamp activation	BCM	MS-CAN	• TRM
Stoplamp request	ABS module	HS-CAN	• BCM
SYNCÂ® alerts	APIM	I-CAN	• ACM • Audio DSP module
Temperature display units	APIM	I-CAN	• IPC
Tire pressure data	RFA module	MS-CAN	• BCM
Tire pressure data (gateway)	BCM	MS-CAN	• IPC
Tire pressure data (gateway)	BCM	HS-CAN	• APIM
Tire pressure indication	BCM	MS-CAN	• IPC
TPMS command	PCM	MS-CAN	• RFA module
Torsion bar torque	PSCM	HS-CAN	• PAM • ABS module
Traction control brake active	ABS module	HS-CAN	• PCM • PSCM • RCM
Traction control mode	ABS module	HS-CAN	• PCM • PAM • PSCM • RCM
Trailer lamp connection status	TRM	MS-CAN	• BCM • IPM-B • IPC
Trailer lamp connection status (gateway)	BCM	HS-CAN	• ABS module • PCM

			• PAM
Transmission gear display	PCM	HS-CAN	• BCM
Transmission gear display (gateway)	BCM	MS-CAN	• IPC
Transmission gear position	PCM	HS-CAN	• ABS module
Transmission gear lever position	PCM	HS-CAN	• ABS module • BCM • HCM • OCSM • PAM • RCM
Transmission in reverse	PCM	HS-CAN	• BCM • ABS module • HCM • PAM • OCSM • PSCM
Transmission message request	PCM	HS-CAN	• BCM
Transmission mode display	PCM	HS-CAN	• BCM
Transmission mode display (gateway)	BCM	MS-CAN	• IPC
Trailer lamp check	TRM	MS-CAN	• BCM • IPC
Trailer module connect status	IPC	I-CAN	• APIM • FCDIM
Transmission mode display actual	PCM	HS-CAN	• BCM
Transmission mode display actual (gateway)	BCM	HS-CAN	• IPC
Transmission neutral tow mode status	PCM	HS-CAN	• BCM
Transmission park lock control	BCM	MS-CAN	• IPC
Transmission service required	PCM	HS-CAN	• BCM
Transmission service required (gateway)	BCM	MS-CAN	• IPC
Transmission shift indicator	PCM	HS-CAN	• BCM

Transmission shift indicator (gateway)	BCM	MS-CAN	• IPC
Transmission shift mode	PCM	HS-CAN	• BCM
Transmission shift mode (gateway)	BCM	MS-CAN	• IPC
Transmission upshift indication request	BCM	MS-CAN	• IPC
Transmission torque data	PCM	HS-CAN	• ABS module
Transport mode	BCM	HS-CAN	• PSCM • PCM • PAM • ABS module • PSCM
Transport mode	BCM	MS-CAN	• IPC
Turn indicator command	BCM	MS-CAN	• IPC • DDM • PDM • TRM
Vehicle configuration data	BCM	HS-CAN	• PCM • HCM • PAM • PSCM • RCM
Vehicle speed	ABS module	HS-CAN	• PSCM • BCM
Vehicle speed (gateway)	BCM	MS-CAN	• IPC • DDM • PDM • LTM
Vehicle speed (gateway)	IPC	I-CAN	• ACM • FCDIM
Vehicle trip display units	APIM	I-CAN	• IPC
Vehicle yaw rate	RCM	HS-CAN	• BCM
Vehicle yaw rate (gateway)	BCM	MS-CAN	• GPSM
Vehicle yaw rate	ABS module	HS-CAN	• PCM • PSCM • PAM

Washer fluid level low	BCM	MS-CAN	• IPC
Wheel measurement	ABS module	HS-CAN	• BCM • PCM • PAM • PSCM
Wheel rotation count	ABS module	HS-CAN	• BCM • PAM
Wheel rotation count (gateway)	BCM	MS-CAN	• IPC
Washer rear command	BCM	MS-CAN	• IPC
Wheel rotation count front	ABS module	HS-CAN	• BCM • PAM
Wheel rotation count front (gateway)	BCM	MS-CAN	• IPC
Wheel rotation direction	ABS module	HS-CAN	• BCM • PAM • PCM
Wheel rotation direction (gateway)	BCM	MS-CAN	• GPSM
Wheel speed data	BCM	MS-CAN	• IPC • GPSM
Wheel speed data (gateway)	IPC	I-CAN	• FCDIM
Wiper speed information	BCM	MS-CAN	• HVAC module

Communications Network

Special Tool(s)

 ST3093-A	Fluke 77-IV Digital Multimeter FLU77-4 or equivalent
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool
 ST2574-A	Flex Probe Kit NUD105-R025D or equivalent

Symptom Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Symptom Chart

Pinpoint Tests

Pinpoint Test A: The PCM Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 23 , Electronic Engine Controls - 2.5L for schematic and connector information.

Refer to Wiring Diagrams Cell 24 , Electronic Engine Controls - 2.0L for schematic and connector information.

Refer to Wiring Diagrams Cell 25 , Electronic Engine Controls - 1.6L for schematic and connector information.

Normal Operation and Fault Conditions

The PCM communicates with the scan tool through the High Speed Controller Area Network (HS-CAN). An IDS session cannot be established if the PCM communication fails when attempting to identify the vehicle.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- PCM

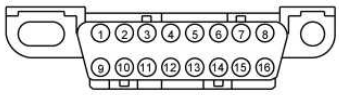
PINPOINT TEST A: THE PCM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
A1 VERIFY WHETHER OTHER HS-CAN MODULES PASS THE NETWORK TEST	
• Using a scan tool, perform the network test. • In the LH pane of the IDS network test display screen, verify whether any HS-CAN modules passed the network test. • **Is "pass" or a DTC listed next to any of the following modules (if equipped): ABS module, APIM , BCM , HCM , OCSM , PAM , PCM, PSCM , RCM or SASM ?**	**Yes** If "pass" or a DTC was listed next to the PCM, a network fault is not currently present. GO to Pinpoint Test AA to diagnose an intermittent HS-CAN fault condition. If "pass" or a DTC was listed next to one or more modules other than the PCM, GO to A2 . **No** No modules are currently communicating on the HS-CAN . GO to Pinpoint Test AA to diagnose no HS-CAN communication.
A2 PC/ED PINPOINT TEST QA VERIFICATION	
• Verify that Powertrain Control/Emissions Diagnosis (PC/ED) pinpoint test QA has been carried out. • **Has pinpoint test QA been carried out?**	**Yes** GO to A3 . **No** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual, Section 5, pinpoint test QA to diagnose no communication with the PCM.
A3 CHECK THE HS-CAN TERMINATION RESISTANCE	

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Disconnect the scan tool from the DLC .
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	C251-14	VDB05 (WH)



- **Is the resistance between 54 and 66 ohms?**

Yes
GO to A6 .

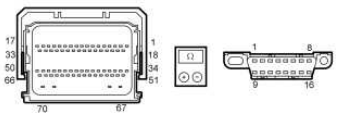
No
For 2.5L engine, GO to A4 .

For 2.0L or 1.6L engine, GO to A5 .

A4 CHECK THE HS-CAN CIRCUITS BETWEEN THE PCM AND THE DLC FOR AN OPEN - 2.5L

- Disconnect: PCM C175B.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C175B-59	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C175B-58	VDB05 (WH)	C251-14	VDB05 (WH)



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- **Are the resistances less than 3 ohms?**

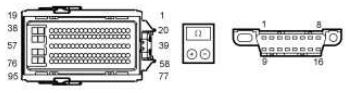
Yes
CONNECT the negative battery cable. GO to A6 .

No
REPAIR the affected circuit. CONNECT the negative battery cable.

A5 CHECK THE HS-CAN CIRCUITS BETWEEN THE PCM AND THE DLC FOR AN OPEN - 2.0L/1.6L

- Disconnect: PCM C1381B (2.0L) or C1551B (1.6L).
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
2.0L Engine			
C1381-69	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C1381b-68	VDB05 (WH)	C251-14	VDB05 (WH)
1.6L Engine			
C1551-69	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C1551B-68	VDB05 (WH)	C251-14	VDB05 (WH)



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- **Are the resistances less than 3 ohms?**

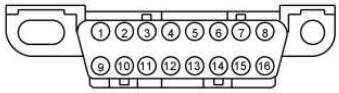
Yes
CONNECT the negative battery cable. GO to A6 .

No
REPAIR the affected circuit. CONNECT the negative battery cable.

A6 CHECK THE HS-CAN CIRCUITS FOR A SHORT TOGETHER

- Disconnect: BCM C2280C.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	C251-14	VDB05 (WH)



- **Is the resistance less than 10,000 ohms?**

Yes
REPAIR the affected circuits.

No
GO to A7 .

A7 CHECK FOR CORRECT PCM OPERATION

• Disconnect and inspect the PCM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the PCM connectors. Make sure they seat and latch correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new PCM. REFER to Section 303-14 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test B: The ABS Module Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 42 , Vehicle Dynamic Systems for schematic and connector information.

Normal Operation and Fault Conditions

The ABS module communicates with the scan tool through the High Speed Controller Area Network (HS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- ABS module

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuses 7 (40A), 8 (30A) and 19 (5A) are OK.

PINPOINT TEST B: THE ABS MODULE DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
B1 CHECK THE VOLTAGE SUPPLY CIRCUIT FOR AN OPEN	

- Ignition OFF.
- Disconnect: ABS Module C135.
- Ignition ON.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C135-1	SBB26 (YE/RD)	-	Ground
C135-8	CBP03 (GY)	-	Ground
C135-32	SBB25 (RD)	-	Ground

- **Are the voltages greater than 11 volts?**

Yes
GO to B2 .

No
VERIFY the Battery Junction Box (BJB) fuse 7 (40A), 8 (30A) or 19 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

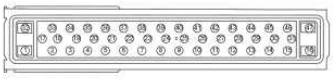
B2 CHECK THE GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Cir	Pin	Circuit
C135-47	GD122 (BK)	-	Ground

Yes
GO to B3 .

No
REPAIR the affected circuit. CONNECT the negative battery cable.

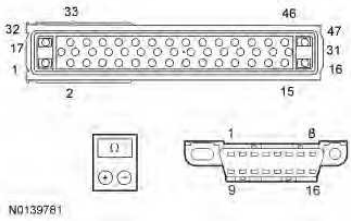


- **Is the resistance less than 3 ohms?**

B3 CHECK THE HS-CAN CIRCUITS BETWEEN THE DLC AND THE ABS MODULE FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C135-12	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C135-13	VDB05 (WH)	C251-14	VDB05 (WH)



- **Are the resistances less than 3 ohms?**

Yes
CONNECT the negative battery cable. GO to B4 .

No
REPAIR the affected circuit. CONNECT the negative battery cable.

B4 CHECK FOR CORRECT ABS MODULE OPERATION

- Disconnect the ABS module connector.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)
  - damaged or bent pins - replace terminals/pins
  - pushed-out pins - replace pins as necessary
- Connect the ABS module connector. Make sure it seats and latches correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new ABS module. REFER to Section 206-09 .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test C: The Body Control Module (BCM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 10 , Grounds for schematic and connector information.

Refer to Wiring Diagrams Cell 13 , Power Distribution/BCM for schematic and connector information.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The Body Control Module (BCM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN) and communicates with the other modules through the Medium Speed Controller Area Network (MS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- BCM

Visual Inspection and Diagnostic Pre-checks

Verify high current BJB MEGA fuses 4 (50A) and 9 (50A) are OK.

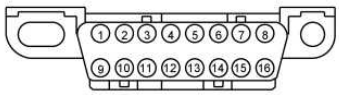
PINPOINT TEST C: THE BCM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed results in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>C1 CHECK THE HS-CAN TERMINATION RESISTANCE</td><td></td></tr>
<tr><td>• Ignition OFF.
• Disconnect: Negative Battery Cable.
• Disconnect the scan tool cable from the Data Link Connector (DLC).
• Measure the resistance between:
<table><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr></table></td><td>Yes
GO to C3 .

No
GO to C2 .</td></tr>
</table>

C251-6	VDB04 (WH/BU)	C251-14	VDB05 (WH)

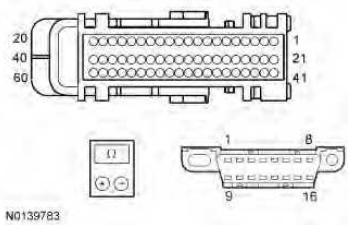


- **Is the resistance between 54 and 66 ohms?**

C2 CHECK THE HS-CAN CIRCUITS BETWEEN THE BCM AND THE DLC FOR AN OPEN

- Disconnect: BCM C2280C.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2280C-7	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C2280C-8	VDB05 (WH)	C251-14	VDB05 (WH)



- **Are the resistances less than 3 ohms?**

Yes
GO to C7 .

No
REPAIR the affected circuit.

C3 CHECK THE MS-CAN TERMINATION RESISTANCE

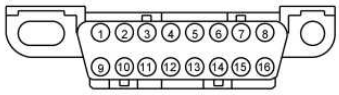
- Measure the **resistance** between:

Positive Lead	Negative Lead

Yes
GO to C5 .

No
GO to C4 .

Pin	Circuit	Pin	Circuit
C251-3	VDB06 (GY/OG)	C251-11	VDB07 (VT/OG)

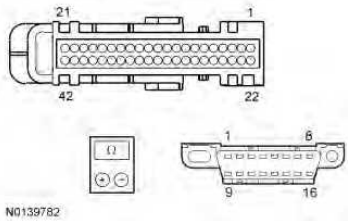


- **Is the resistance between 54 and 66 ohms?**

C4 CHECK THE MS-CAN CIRCUITS BETWEEN THE BCM AND THE DLC FOR AN OPEN

- Disconnect: BCM C2280A.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2280A-41	VDB06 (GY/OG)	C251-3	VDB06 (GY/OG)
C2280A-40	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)



- **Are the resistances less than 3 ohms?**

Yes
GO to C7 .

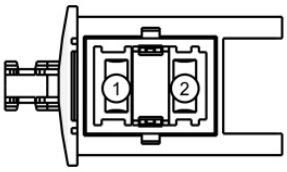
No
REPAIR the affected circuit.

C5 CHECK THE BCM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

NOTE: Measurements are taken with the fuse installed and probes placed at the terminals on the back of the fuse blade.

- Ignition ON.
- Disconnect: BCM C2280G.
- Connect: Negative Battery Cable.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
2	SBB17 (RD)	-	Ground
1	SBB18 (YE)	-	Ground



- **Are the voltages greater than 11 volts?**

Yes
GO to C6 .

No
VERIFY high current BJB MEGA fuses 4 (50A) and 9 (50A) are OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

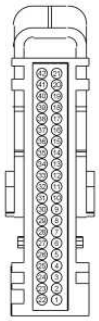
C6 CHECK THE BCM GROUND CIRCUIT FOR AN OPEN

- Disconnect: BCM C2280A and C2280E.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2280A-3	GD123 (BK/GY)	-	Ground

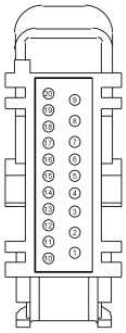
Yes
GO to C7 .

No
REPAIR the affected circuit.



- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2280E-2	GD140 (BK/GY)	-	Ground



- **Is the resistance less than 3 ohms?**

C7 CHECK FOR CORRECT BCM OPERATION	
• Disconnect all the BCM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the BCM connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Section 419-10 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test D: The Instrument Panel Cluster (IPC) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 60 , Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

The Instrument Panel Cluster (IPC) communicates with the scan tool and other network modules on the Medium Speed Controller Area Network (MS-CAN) and communicates with other network modules through the Infotainment Controller Area Network (I-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- IPC

Visual Inspection and Diagnostic Pre-checks

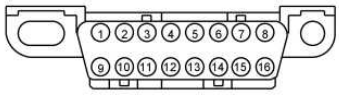
Verify BCM fuse 69 (5A) is OK.

PINPOINT TEST D: THE IPC DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>D1 CHECK THE I-CAN TERMINATION RESISTANCE</td><td></td></tr>
<tr><td>• Ignition OFF.
• Disconnect: Negative Battery Cable.
• Disconnect the scan tool cable from the Data Link Connector (DLC).
• Measure the resistance between:
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C251-1</td><td>VDB13 (BU/GY)</td><td>C251-9</td><td>VDB14 (VT/GY)</td></tr>
</table></td><td>Yes
GO to D3 .

No
GO to D2 .</td></tr>
</table>

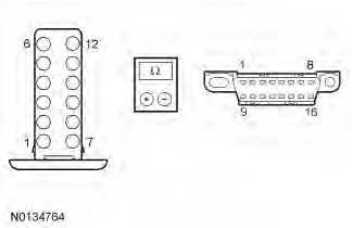


- **Is the resistance between 54 and 66 ohms?**

D2 CHECK THE I-CAN CIRCUITS BETWEEN THE IPC AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C220-5	VDB13 (BU/GY)	C251-1	VDB13 (BU/GY)
C220-4	VDB14 (VT/GY)	C251-8	VDB14 (VT/GY)



- **Are the resistances less than 3 ohms?**

Yes
GO to D7 .

No
REPAIR the affected circuit.

D3 CHECK THE MS-CAN TERMINATION RESISTANCE

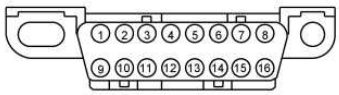
- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Disconnect the scan tool cable from the Data Link Connector (DLC).
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit

Yes
GO to D5 .

No
GO to D4 .

C251-3	VDB06 (GY/OG)	C251-11	VDB07 (VT/OG)

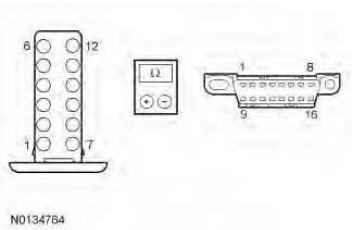


- **Is the resistance between 54 and 66 ohms?**

D4 CHECK THE MS-CAN CIRCUITS BETWEEN THE IPC AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C220-2	VDB06 (GY/OG)	C251-3	VDB06 (GY/OG)
C220-1	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)



- **Are the resistances less than 3 ohms?**

Yes
GO to D7 .

No
REPAIR the affected circuit.

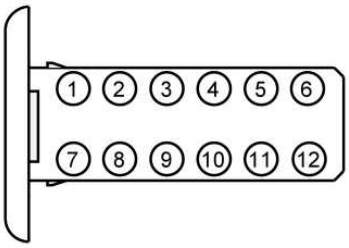
D5 CHECK THE IPC VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

- Disconnect: IPC C220.
- Ignition ON.
- Measure the **voltage** between:

Yes
GO to D6 .

No
VERIFY BCM fuse 69 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C220-3	SBP08 (VT/RD)	-	Ground

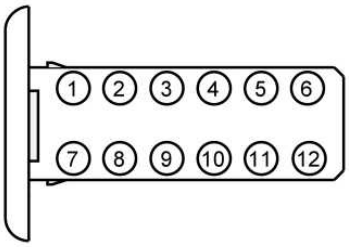


- **Is the voltage greater than 11 volts?**

D6 CHECK THE IPC GROUND CIRCUIT FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C220-10	GD138 (BK)	-	Ground



- **Is the resistance less than 3 ohms?**

Yes
GO to D7 .

No
REPAIR the circuit.

D7 CHECK FOR CORRECT IPC OPERATION

- Disconnect and inspect the IPC connector.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new IPC . REFER to Section 413-01 .

♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the IPC connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test E: The Power Steering Control Module (PSCM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 43 , Power Steering Controls for schematic and connector information.

Normal Operation and Fault Conditions

The Power Steering Control Module (PSCM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- PSCM

Visual Inspection and Diagnostic Pre-Checks

Verify high current BJB fuse 1 (80A) and BJB fuse 40 (5A) are OK.

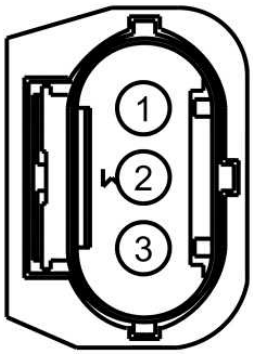
PINPOINT TEST E: THE PSCM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
E1 CHECK THE PSCM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN	

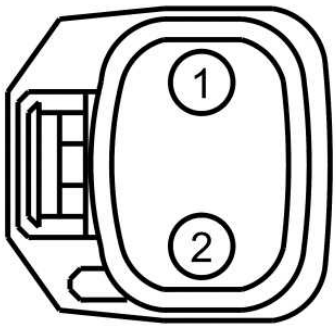
- Disconnect: PSCM C1463A and C1463B.
- Ignition ON.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C1463A-3	CBB40 (YE/GN)	-	Ground



- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C1463B-1	SBF01(RD)	-	Ground



- **Is the voltage greater than 11 volts?**

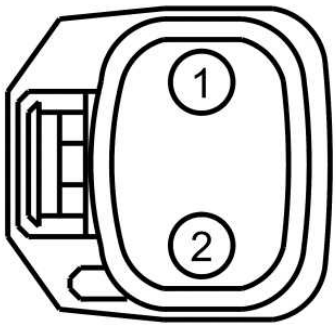
Yes
GO to E2 .

No
VERIFY the high current BJB fuse 1 (80A) or BJB fuse 40 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

E2 CHECK THE PSCM GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C1463B-2	GD120 (BK/GN)	-	Ground



- **Is the resistance less than 3 ohms?**

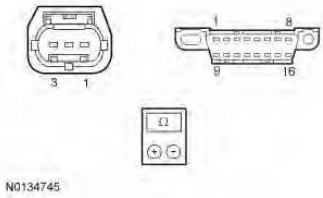
Yes
GO to E3 .

No
REPAIR the affected circuit.

E3 CHECK THE HS-CAN CIRCUITS BETWEEN THE PSCM AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C1463A-1	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C1463A-2	VDB05 (WH)	C251-14	VDB05 (WH)



- **Are the resistances less than 3 ohms?**

Yes
GO to E4 .

No
REPAIR the affected circuit.

E4 CHECK FOR CORRECT PSCM OPERATION	
• Disconnect all the PSCM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the PSCM connectors. Make sure they seat and latch correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new PSCM . REFER to Section 211-02 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test F: The Restraints Control Module (RCM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 46 , Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The Restraints Control Module (RCM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- Case ground
- RCM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 86 (10A) is OK.

PINPOINT TEST F: THE RCM DOES NOT RESPOND TO THE SCAN TOOL

⚠ **WARNING: Never probe the electrical connectors on airbag, Safety Canopy® or side air curtain assemblies. Failure to follow this instruction may result in the accidental deployment of these assemblies, which increases the risk of serious personal injury or death.**

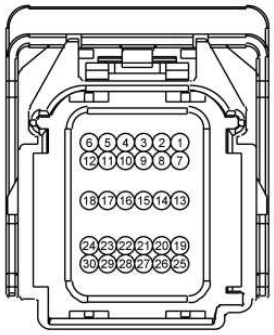
⚠ **WARNING: Never disassemble or tamper with seat belt deployable components, including pretensioners, load limiters and inflators. Never back probe deployable device electrical connectors. Tampering or back probing may cause an accidental deployment and result in personal injury or death.**

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

NOTE: The Supplemental Restraint System (SRS) must be fully operational and free of faults before releasing the veicle to the customer.

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>F1 CHECK THE RCM CONNECTION</td><td></td></tr>
<tr><td>• Ignition OFF.
• Depower the SRS . Refer to Section 501-20B .
• Disconnect: RCM C310A.
• Disconnect: RCM C310B.
• Inspect the RCM connectors for damaged, pushed out or corroded pins.
• Are RCM C310A pin 19 and RCM C310B pins 47 and 48 OK?</td><td>Yes
GO to F2 .

No
INSTALL a new wiring harness. REPOWER the SRS . REFER to Section 501-20B .</td></tr>
<tr><td>F2 CHECK THE RCM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>• Repower the SRS . Refer to Section 501-20B .
• Ignition ON.
• Measure the voltage between:

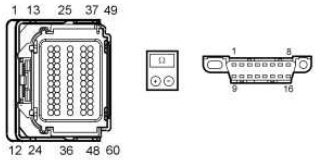
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C310A-19</td><td>CBP86 (WH/BU)</td><td>-</td><td>Ground</td></tr>
</table>


• Is the voltage greater than 11 volts?</td><td>Yes
GO to F3 .

No
VERIFY the BCM fuse 86 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.</td></tr>
</table>

F3 CHECK THE RCM CASE GROUND	
• Ignition OFF. • Disconnect: Negative Battery Cable. • Measure the resistance between the RCM case and a good chassis ground. • **Is the resistance less than 3 ohms?**	**Yes** GO to F4 . **No** REPAIR the RCM case ground as necessary. CONNECT the negative battery cable.
F4 CHECK THE HS-CAN CIRCUITS BETWEEN THE RCM AND THE DLC FOR AN OPEN	
• Depower the SRS . Refer to Section 501-20B . • Measure the **resistance** between:	**Yes** CONNECT the negative battery cable. GO to F5 . **No** REPAIR the affected circuit. CONNECT the negative battery cable.

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C310B-48	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C310B-47	VDB05 (WH)	C251-14	VDB05 (WH)



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• **Are the resistances less than 3 ohms?**

F5 CHECK FOR CORRECT RCM OPERATION	
• Disconnect all the RCM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the RCM connectors. Make sure they seat and latch correctly. • Repower the SRS . Refer to Section 501-20B . • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new RCM . REFER to Section 501-20B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test G: The Occupant Classification System Module (OCSM) Does Not Communicate With the Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 46 , Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The Occupant Classification System Module (OCSM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- OCSM

Visual Inspection and Diagnostic Pre-checks

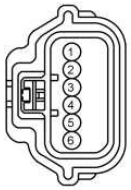
Verify BJB fuse 37 (10A) is OK.

PINPOINT TEST G: THE OCSM DOES NOT COMMUNICATE WITH THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>G1 CHECK THE OCSM VOLTAGE SUPPLY CIRCUITS FOR AN OPEN</td><td></td></tr>
<tr><td>• Ignition OFF.
• Disconnect: OCSM C3159.
• Ignition ON.
• Measure the voltage between:
<table><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr><tr><td>C3159-1</td><td>CBX02 (BN/RD)</td><td>-</td><td>Ground</td></tr></table></td><td>Yes
GO to G2 .

No
VERIFY the BJB fuse 37 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.</td></tr>
</table>



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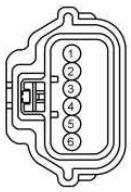
- **Is the voltage greater than 11 volts?**

OCSM GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C3159-4	GD901 (BK)	-	Ground



N0139786

- **Is the resistance less than 3 ohms?**

Yes
GO to G3 .

No
REPAIR the affected circuit.

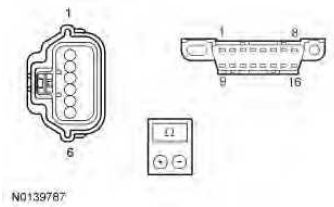
G3 CHECK THE HS-CAN CIRCUITS BETWEEN THE OCSM AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C3159-2	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C3159-3	VDB05 (WH)	C251-14	VDB05 (WH)

Yes
CONNECT the negative battery cable. GO to G4 .

No
REPAIR the affected circuit.

 • **Are the resistances less than 3 ohms?**	
G4 CHECK FOR CORRECT OCSM OPERATION	
• Disconnect the OCSM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the OCSM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new OCSM . REFER to Section 501-20B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test H: The Steering Angle Sensor Module (SASM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 31 , Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

The Steering Angle Sensor Module (SASM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN).

Possible Sources

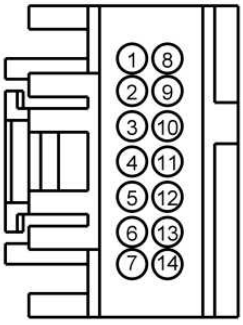
- Fuse
- Wiring, terminals or connectors
- SASM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 72 (7.5A) is OK.

PINPOINT TEST H: THE SASM DOES NOT RESPOND TO THE SCAN TOOL

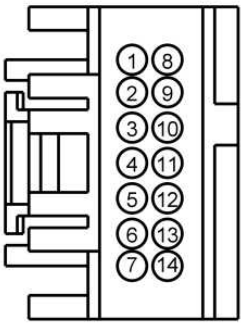
NOTE: Failure to disconnect the battery when instructed results in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>H1 CHECK THE SASM VOLTAGE SUPPLY CIRCUITS FOR AN OPEN</td><td></td></tr>
<tr><td>
• Ignition OFF.
• Disconnect: SASM C226A.
• Ignition ON.
• Measure the voltage between:
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C226A-1</td><td>SBP07 (WH/RD)</td><td>-</td><td>Ground</td></tr>
</table>


• Is the voltage greater than 11 volts?
</td><td>
Yes
GO to H2 .

No
VERIFY the Body Control Module (BCM) fuse 72 (7.5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.
</td></tr>
<tr><td>H2 CHECK THE SASM GROUND CIRITS FOR AN OPEN</td><td></td></tr>
<tr><td>
• Ignition OFF.
• Disconnect: Negative Battery Cable.
• Measure the resistance between:
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C226A-14</td><td>GD138 (BK/WH)</td><td>-</td><td>Ground</td></tr>
</table>
</td><td>
Yes
GO to H3 .

No
REPAIR the affected circuit.
</td></tr>
</table>

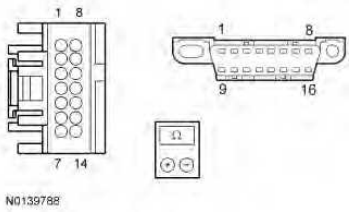


- **Is the resistance less than 3 ohms?**

H3 CHECK THE HS-CAN CIRCUITS BETWEEN THE SASM span> AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C226A-4	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C226A-5	VDB05 (WH)	C251-14	VDB05 (WH)



- **Are the resistances less than 3 ohms?**

Yes
CONNECT the negative battery cable. GO to H4 .

No
REPAIR the affected circuit.

H4 CHECK FOR CORRECT SASM OPERATION

- Disconnect all the SASM connectors.
- Repair:
  - ♦ corrosion (replace connector or terminals - clean module pins)
  - ♦ damaged or bent pins - replace terminals/pins
  - ♦ pushed-out pins - replace pins as necessary
- Reconnect all the SASM connectors. Make sure they seat and latch correctly.
- Verify the concern is still present.
- **Is the concern still present?**

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new SASM . REFER to Section 206-09 .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test I: The Parking Aid Module (PAM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 131 , Parking Aid for schematic and connector information.

Normal Operation and Fault Conditions

The Parking Aid Module (PAM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- PAM

Visual Inspection and Diagnostic Pre-checks

Verify RJB fuse 30 (5A) is OK.

PINPOINT TEST I: THE PAM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>I1 CHECK THE PAM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>

- Ignition OFF.
- Disconnect: PAM C4014A.
- Ignition ON.
- Measure the **voltage** between:

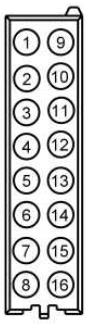
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C4014A-1</td><td>CBR01 (BU)</td><td>-</td><td>Ground</td></tr>
</table>

</td><td>

Yes
GO to I2 .

No
VERIFY the RJB fuse 30 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

</td></tr>
</table>

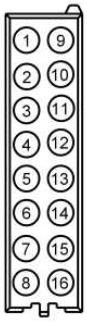


- **Is the voltage greater than 11 volts?**

I2 CHECK THE PAM GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistae** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4014A-8	GD152 (BK/BU)	-	Ground



- **Is the resistance less than 3 ohms?**

Yes
GO to I3 .

No
REPAIR the affected circuit.

I3 CHECK THE HS-CAN CIRCUITS BETWEEN THE PAM AND THE DLC FOR AN OPEN

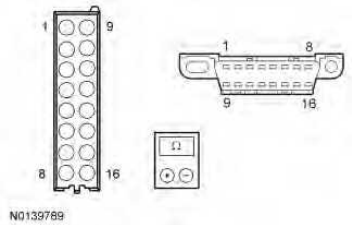
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4014A-6	VDB04 (BU)	C251-6	VDB04 (WH/BU)

Yes
GO to I4 .

No
REPAIR the affected circuit.

C4014A-15	VDB05 (WH)	C251-14	VDB05 (WH)



- **Are the resistances less than 3 ohms?**

I4 CHECK FOR CORRECT PAM OPERATION	
• Disconnect the PAM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the PAM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new PAM . REFER to Section 413-13A . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test J: The Remote Function Actuator (RFA) Module Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 117 , Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operation and Fault Conditions

The Remote Function Actuator (RFA) module communicates with the scan tool through the Medium Speed Controller Area Network (MS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- RFA module

Visual Inspection and Diagnostic Pre-checks

Verify RJB fuse 2 (10A) is OK.

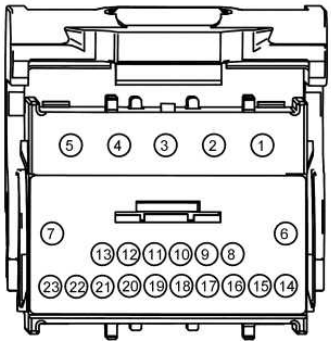
PINPOINT TEST J: THE RFA MODULE DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>J1 CHECK THE RFA MODULE VOLTAGE SUPPLY CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>

- Ignition OFF.
- Disconnect: RFA Module C4392C (Blue hardshell).
- Ignition ON.
- Measure the **voltage** between:

<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C4392C-5</td><td>SBR08 (VT/RD)</td><td>-</td><td>Ground</td></tr>
</table>



- **Is the voltage greater than 11 volts?**

</td><td>

Yes
GO to J2 .

No
VERIFY the RJB fuse 2 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

</td></tr>
<tr><td>J2 CHECK THE RFA MODULE GROUND CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

<table>
<tr><th>Positive Lead</th><th></th></tr>
</table>

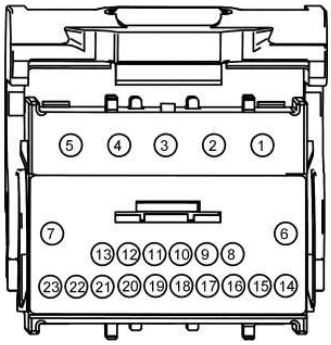
</td><td>

Yes
GO to J3 .

No
REPAIR the affected circuit.

</td></tr>
</table>

		Negative Lead	
Pin	Circuit	Pin	Circuit
C4392C-4	GD143 (BK/VT)	-	Ground
C4392C-23	GD140 (BK)	-	Ground

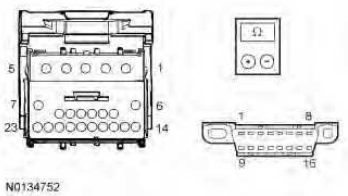


- **Are the resistances less than 3 ohms?**

J3 CHECK THE MS-CAN CIRCUITS BETWEEN THE RFA MODULE AND THE D FOR AN OPEN

- Disconnect: RFA Module C4392D (natural hardshell).
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4392D-3	VDB06 (GY/OG)	C251-3	VDB06 (GY/OG)
C4392D-4	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)



- **Are the resistances less than 3 ohms?**

Yes
GO to J4 .

No
REPAIR the affected circuit.

J4 CHECK FOR CORRECT RFA MODULE OPERATION

- Disconnect all the RFA module connectors.
- Repair:

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this

♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the RFA module connectors. Make sure they seat and latch correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new RFA module. REFER to Section 419-10 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test K: The Accessory Protocol Interface Module (APIM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 130 , Audio System/Navigation for schematic and connector information.

Normal Operation and Fault Conditions

The Accessory Protocol Interface Module (APIM) communicates with the scan tool and other network modules on the High Speed Controller Area Network (HS-CAN) and Infotainment Controller Area Network (I-CAN) (4.2-inch screen). The APIM also communicates with other network modules on the Medium Speed Controller Area Network (MS-CAN) (8-inch touchscreen).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- APIM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 67 (7.5A) is OK.

PINPOINT TEST K: THE APIM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
K1 CHECK THE APIM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN	

- Disconnect: APIM C3342 (4.2-inch screen) or C2383 (8-inch touchscreen).
- Ignition ON.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
4.2-inch screen			
C3342-1	SBP06 (BN/RD)	-	Ground
8-inch touchscreen			
C2383-1	SBP06 (BN/RD)	-	Ground

- **Is the voltage greater than 11 volts?**

Yes
GO to K2 .

No
VERIFY the Body Control Module (BCM) fuse 67 (7.5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

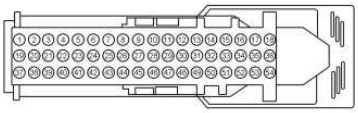
K2 CHECK THE APIM GROUND CIRCUITS FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
4.2-inch screen			
C3342-37	GD135 (BK/GY)	-	Ground
C3342-38	GD135 (BK/GY)	-	Ground
8-inch touchscreen			
C2383-37	GD135 (BK/GY)	-	Ground

Yes
GO to K3 .

No
REPAIR the affected circuit.

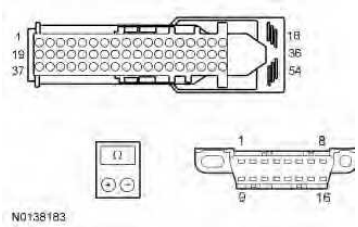


- **Are the resistances less than 3 ohms?**

K3 CHECK THE HS-CAN CIRCUITS BETWEEN THE APIM AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
4.2-inch screen			
C3342-53	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C3342-54	VDB05 (WH)	C251-14	VDB05 (WH)
8-inch touchscreen			
C2383-53	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C2383-53	VDB05 (WH)	C251-14	VDB05 (WH)



- **Are the resistances less than 3 ohms?**

Yes
If equipped with an 8-inch touchscreen, GO to K4 .

If not equipped with an 8-inch touchscreen, GO to K5 .

No
REPAIR the affected circuit.

K4 CHECK THE MS-CAN CIRCUITS BETWEEN THE APIM AND THE DLC FOR AN OPEN

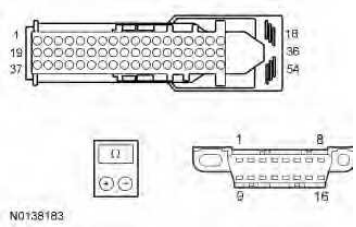
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2383-16		C251-3	

Yes
GO to K5 .

No
REPAIR the affected circuit.

	VDB06 (GY/OG)		VDB06 (GY/OG)
C2383-17	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)



- **Are the resistances less than 3 ohms?**

K5 CHECK FOR CORRECT APIM OPERATION	
• Disconnect the APIM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the APIM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new APIM . Refer to the appropriate section in Group 415 for the procedure. **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test L: The Audio Front Control Module (ACM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 130 , Audio System/Navigation for schematic and connector information.

Normal Operation and Fault Conditions

The Audio Front Control Module (ACM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN). The IPC is used as a gateway module.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- ACM

Visual Inspection and Diagnostic Pre-checks

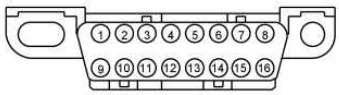
Verify BCM fuse 79 (15A) is OK.

PINPOINT TEST L: THE ACM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>L1 CHECK THE I-CAN TERMINATION RESISTANCE</td><td></td></tr>
<tr><td>• Ignition OFF.
• Disconnect: Negative Battery Cable.
• Measure the resistance between:

<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C251-1</td><td>VDB13 (BU/GY)</td><td>C251-8</td><td>VDB14 (VT/GY)</td></tr>
</table>

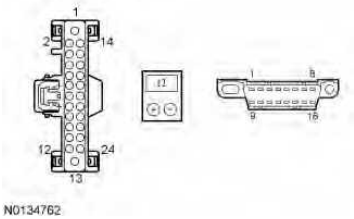
• Is the resistance between 54 and 66 ohms?</td><td>Yes
GO to L3 .

No
GO to L2 .</td></tr>
<tr><td>L2 CHECK THE I-CAN CIRCUITS BETWEEN THE ACM AND THE DLC FOR AN OPEN</td><td></td></tr>
<tr><td>• Disconnect: ACM C240A.
• Measure the resistance between:

<table>
<tr><th>Positive Lead</th><th>Negative Lead</th></tr>
</table></td><td>Yes
GO to L3 .

No
REPAIR the affected circuit.</td></tr>
</table>

Pin	Circuit	Pin	Circuit
C240A-14	VDB13 (BU/GY)	C251-1	VDB13 (BU/GY)
C240A-15	VDB14 (VT/GY)	C251-8	VDB14 (VT/GY)

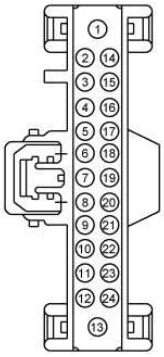


- **Are the resistances less than 3 ohms?**

L3 CHECK THE ACM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

- Disconnect: ACM C240A.
- Connect: Negative Battery Cable.
- Ignition ON.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C240A-1	SBP06 (BN/RD)	-	Ground



- **Is the voltage greater than 11 volts?**

Yes
GO to L4 .

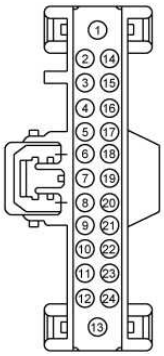
No
VERIFY the Body Control Module (BCM) fuse 79 (15A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

L4 CHECK THE ACM GROUND CIRCUIT FOR AN OPEN

<table>
<tr>
<td>

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C240A-13</td><td>GD103 (BK)</td><td>-</td><td>Ground</td></tr>
</table>



- **Is the resistance less than 3 ohms?**

</td>
<td>

Yes
GO to L5 .

No
REPAIR the affected circuit.

</td>
</tr>
<tr>
<td>

L5 CHECK FOR CORRECT ACM OPERATION

</td>
<td></td>
</tr>
<tr>
<td>

- Disconnect all the ACM connectors.
- Repair:
  - ♦ corrosion (replace connector or terminals - clean module pins)
  - ♦ damaged or bent pins - replace terminals/pins
  - ♦ pushed-out pins - replace pins as necessary
- Reconnect all the ACM connectors. Make sure they seat and latch correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

</td>
<td>

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new ACM . Refer to the appropriate section in Group 415 for the procedure.

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

</td>
</tr>
</table>

Pinpoint Test M: The Front Controls Interface Module (FCIM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 130 , Audio System/Navigation for schematic and connector information.

Normal Operation and Fault Conditions

The Front Controls Interface Module (FCIM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN). The IPC is used as a gateway module.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- FCIM

Visual Inspection and Diagnostic Pre-checks

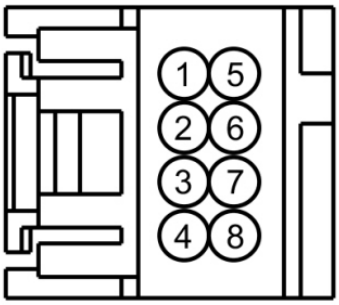
Verify BCM fuse 79 (15A) is OK.

PINPOINT TEST M: THE FCIM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>M1 CHECK THE FCIM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>• Ignition OFF.
• Disconnect: FCIM C2402.
• Ignition ON.
• Measure the voltage between:
<table><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr><tr><td>C2402-8</td><td>SBP06 (BN/RD)</td><td>-</td><td>Ground</td></tr></table></td><td>Yes
GO to M2 .

No
VERIFY the Body Control Module (BCM) fuse 79 (15A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.</td></tr>
</table>



- **Is the voltage greater than 11 volts?**

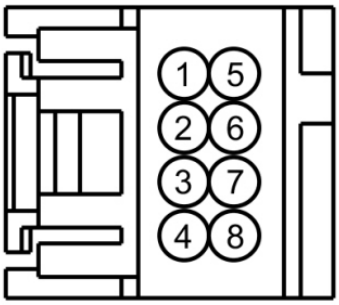
M2 CHECK THE FCIM GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2402-5	GD133 (BK/WH)	-	Ground

Yes
GO to M3 .

No
REPAIR the affected circuit.



- **Is the resistance less than 3 ohms?**

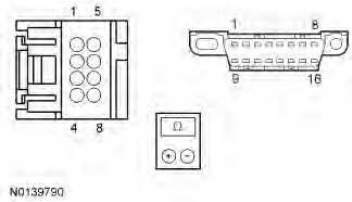
M3 CHECK THE I-CAN CIRCUITS BETWEEN THE FCIM AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2402-7	VDB13 (BU/GY)	C251-1	VDB13 (BU/GY)
C2402-4	VDB14 (VT/GY)	C251-8	VDB14 (VT/GY)

Yes
GO to M4 .

No
REPAIR the affected circuit.

 • **Are the resistances less than 3 ohms?**	
M4 CHECK FOR CORRECT FCIM OPERATION	
• Disconnect the FCIM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the FCIM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new FCIM . REFER to Refer to the appropriate section in Group 415 for the procedure. **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test N: The Front Control/Display Interface Module (FCDIM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 130 , Audio System/Navigation for schematic and connector information.

Normal Operation and Fault Conditions

The Front Control/Display Interface Module (FCDIM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN). The IPC is used as a gateway module.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- FCDIM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 67 (7.5A) is OK.

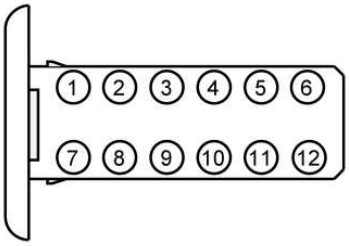
PINPOINT TEST N: THE FCDIM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>N1 CHECK THE FCDIM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>

- Ignition OFF.
- Disconnect: FCDIM C2123.
- Ignition ON.
- Measure the **voltage** between:

<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C2123-1</td><td>SBB06 (BN/RD)</td><td>-</td><td>Ground</td></tr>
</table>



- **Is the voltage greater than 11 volts?**

</td><td>

Yes
GO to N2 .

No
VERIFY the Body Control Module (BCM) fuse 67 (7.5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

</td></tr>
<tr><td>N2 CHECK THE FCDIM GROUND CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

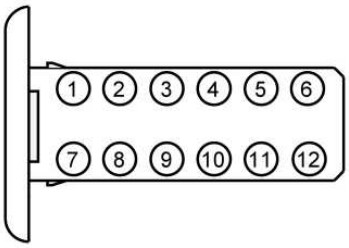
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C2123-9</td><td>GD138 (BK/WH)</td><td>-</td><td>Ground</td></tr>
<tr><td>C2123-11</td><td>GD138 (BK/WH)</td><td>-</td><td>Ground</td></tr>
</table>

</td><td>

Yes
GO to N3 .

No
REPAIR the affected circuit.

</td></tr>
</table>

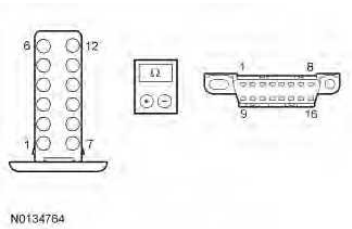


- **Are the resistances less than 3 ohms?**

N3 CHECK THE I-CAN CIRCUITS BETWEEN THE FCDIM AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2123-4	VDB13 (BU/GY)	C251-1	VDB13 (BU/GY)
C2123-5	VDB14 (VT/GY)	C251-8	VDB14 (VT/GY)



- **Are the resistances less than 3 ohms?**

Yes
CONNECT the negative battery cable. GO to N4 .

No
REPAIR the affected circuit. CONNECT the negative battery cable.

N4 CHECK FOR CORRECT FCDIM OPERATION

- Disconnect the FCDIM connector.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)
  - damaged or bent pins - replace terminals/pins
  - pushed-out pins - replace pins as necessary
- Connect the FCDIM connector. Make sure it seats and latches correctly.

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new FCDIM . REFER to Section 415-00A or Section 415-00B .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any

• Operate the system and verify the concern is still present. • **Is the concern still present?**	connector or pin issues.

Pinpoint Test O: The Global Positioning System Module (GPSM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 130 , Audio System/Navigation for schematic and connector information.

Normal Operation and Fault Conditions

The Global Positioning System Module (GPSM) communicates with the scan tool through the Medium Speed Controller Area Network (MS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- GPSM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 67 (7.5A) is OK.

PINPOINT TEST O: THE GPSM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>O1 CHECK THE GPSM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>• Ignition OFF.
• Disconnect: GPSM C2398.
• Ignition ON.
• Measure the voltage between:
<table><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><td>Pin</td><td>Circuit</td><td>Pin</td><td>Circuit</td></tr></table></td><td>Yes
GO to O2 .

No
VERIFY the Body Control Module (BCM) 67 (7.5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.</td></tr>
</table>

C2398-1	VMN03 (BN/RD)	- •	**Is the voltage greater than 11 volts?**

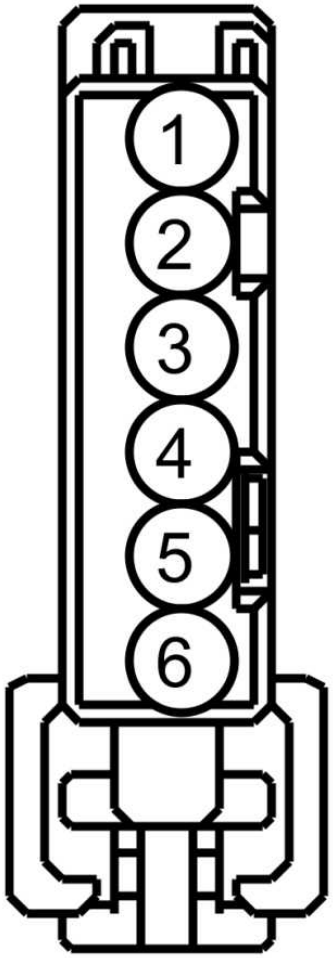
O2 CHECK THE GPSM GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2398-6	GD138 (BK/WH)	-	Ground

Yes
GO to O3 .

No
REPAIR the affected circuit.



- **Is the resistance less than 3 ohms?**

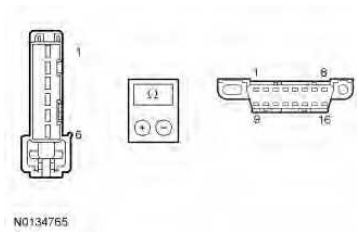
O3 CHECK THE MS-CAN CIRCUITS BETWEEN THE GPSM AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2398-2	VDB06 (GY/OG)	C251-3	VDB06 (GY/OG)
C2398-3	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)

Yes
GO to O4 .

No
REPAIR the affected circuit.

 • **Are the resistances less than 3 ohms?**	
O4 CHECK FOR CORRECT GPSM OPERATION	
• Disconnect the GPSM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the GPSM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new GPSM . Refer to the appropriate section in Group 415 for the procedure. **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test P: The Side Obstacle Detection Control Module - Left (SOD-L) or Side Obstacle Detection Control Module - Right (SOD-R) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 136 , Vehicle Emergency Messaging System for schematic and connector information.

Normal Operation and Fault Conditions

The Side Obstacle Detection Control Module - Left (SOD-L) and Side Obstacle Detection Control Module - Right (SOD-R) communicate with the scan tool through an extended Medium Speed Controller Area Network (MS-CAN) to the BCM . The BCM translates the messages to the scan tool.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- BCM
- SOD-L
- SOD-R

Visual Inspection and Diagnostic Pre-checks

Verify RJB fuse 29 (5A) is OK.

PINPOINT TEST P: THE SOD-L OR SOD-R DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

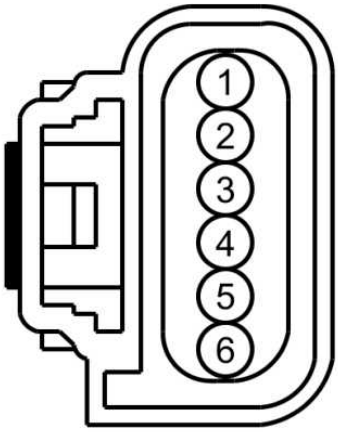
<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>P1 PERFORM A NETWORK TEST</td><td></td></tr>
<tr><td>• Using a scan tool, perform the network test.
• In the LH pane of the IDS network test display screen, verify whether the following modules pass the network test.
• Is "pass" or a DTC listed next to any of the following modules: SOD-L , SOD-R or BCM ?</td><td>Yes
If all modules passed the network test, the system is operating correctly at this time. The concern may have been caused by an intermittent concern.

For either the SOD-L or the SOD-R , GO to P2 .

No
GO to Pinpoint Test c .</td></tr>
<tr><td>P2 CHECK THE EXTENDED MS-CAN TERMINATION RESISTANCE</td><td></td></tr>
<tr><td>• Ignition OFF.
• Disconnect: Negative Battery Cable.
• Disconnect: SOD-L C4369.
• Disconnect: SOD-R C4370.
• Measure the resistance between:

<table><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr><tr><td>C4369-4</td><td>VDB06 (GY/OG)</td><td>C4369-3</td><td>VDB07 (VT/OG)</td></tr><tr><td>C4370-4</td><td>VDB06 (GY/OG)</td><td>C4370-3</td><td>VDB07 (VT/OG)</td></tr></table></td><td>Yes
GO to P5 .

No
GO to P3 .</td></tr>
</table>



- **Are the resistances between 54 and 66 ohms?**

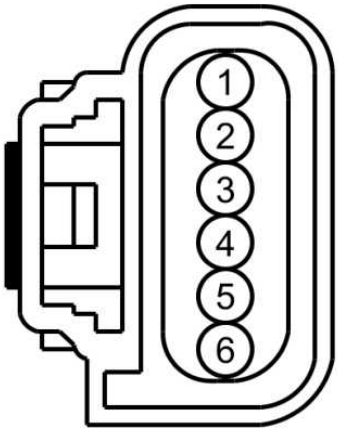
P3 CHECK THE MS-CAN CIRCUITS BETWEEN THE SOD-L AND SOD-R FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4369-4	VDB06 (GY/OG)	C4370-4	VDB06 (GY/OG)
C4369-3	VDB07 (VT/OG)	C4370-3	VDB07 (VT/OG)

Yes
GO to P4 .

No
REPAIR the affected circuit.



- **Are the resistances less than 3 ohms?**

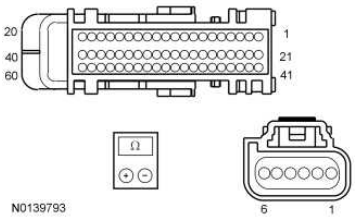
P4 CHECK THE MS-CAN CIRCUITS BETWEEN THE SOD-L , SOD-R AND THE BCM FOR AN OPEN

- Disconnect: BCM C2280B.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4369-4	VDB06 (GY/OG)	C2280B-60	VDB06 (GY/OG)
C4369-3	VDB07 (VT/OG)	C2280B-40	VDB07 (VT/OG)
C4370-4	VDB06 (GY/OG)	C2280B-38	VDB06 (GY/OG)
C4370-3	VDB07 (VT/OG)	C2280B-58	VDB07 (VT/OG)

Yes
GO to P8 .

No
REPAIR the affected circuit.



- **Are the resistances less than 3 ohms?**

P5 CHECK THE SOD-L OR SOD-R VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

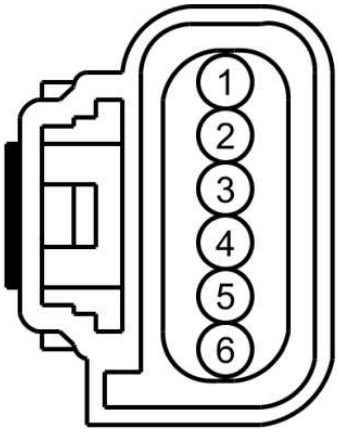
- Ignition ON.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
SOD-L			
C4369-5	CBR11 (BU/RD)	-	Ground
SOD-R			
C4370-5	CBR11 (BU/RD)	-	Ground

>

Yes
GO to P6 .

No
VERIFY the RJB fuse 29 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.



- **Is the voltage greater than 11 volts?**

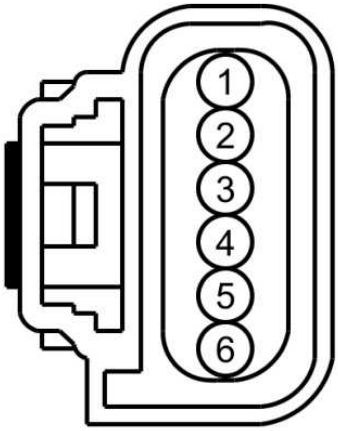
P6 CHECK THE SOD-L OR SOD-R GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
SOD-L			
C4369-2	GD350 (BK/WH)	-	Ground
SOD-R			
C4370-1	GD352 (BK/BU)	-	Ground
C4370-2	GD352 (BK/BU)	-	Ground

Yes
GO to P7 .

No
REPAIR the affected circuit.

 • **Is the resistance less than 3 ohms?**	
P7 CHECK FOR C SOD-L OR SOD-R OPERATION	
• Disconnect the SOD-L or SOD-R connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the SOD-L or SOD-R connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new SOD-L or SOD-R . REFER to Section 419-04 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
P8 CHECK FOR CORRECT BCM OPERATION	
• Disconnect the BCM connector. • Repair:	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE

♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the BCM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Section 419-10 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test Q: The Driver Seat Module (DSM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 123 , Memory Seats for schematic and connector information.

Normal Operation and Fault Conditions

The Driver Seat Module (DSM) communicates with the scan tool through the Medium Speed Controller Area Network (MS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- DSM

Visual Inspection and Diagnostic Pre-checks

Verify RJB fuses 9 (25A) and 10 (5A) are OK.

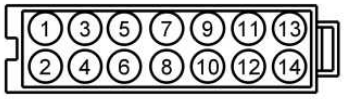
PINPOINT TEST Q: THE DSM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
Q1 CHECK THE DSM VOLTAGE SUPPLY CIRCUITS FOR AN OPEN	

- Ignition OFF.
- Disconnect: DSM C341D.
- Ignition ON.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C341D-6	CBX05 (VT/RD)	-	Ground
C341D-12	CBX05 (VT/RD)	-	Ground
C341D-14	CBX03 (BU/RD)	-	Ground



- **Are the voltages greater than 11 volts?**

Yes
GO to Q2 .

No
VERIFY the RJB fuses 9 (25A) or 10 (5A) is OK. If OK, REPAIR the circuit in question. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

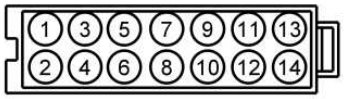
Q2 CHECK THE DSM GROUND CIRCUITS FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C341D-8	GD903 (BK/WH)	-	Ground
C341D-10	GD903 (BK/WH)	-	Ground
C341D-11	GD906 (BK/GY)	-	Ground

Yes
GO to Q3 .

No
REPAIR the affected circuit.

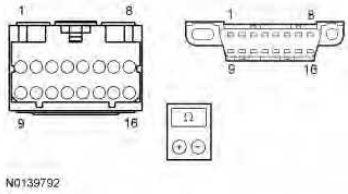


- **Are the resistances less than 3 ohms?**

Q3 CHECK THE MS-CAN CIRCUITS BETWEEN THE DSM AND THE DLC FOR AN OPEN

- Disconnect: DSM C341B.
- Measure the **resistance** ben:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C341B-6	VDB06 (GY/OG)	C251-3	VDB06 (GY/OG)
C341B-7	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)



- **Are the resistances less than 3 ohms?**

Yes
GO to Q4 .

No
REPAIR the affected circuit.

Q4 CHECK FOR CORRECT DSM OPERATION

- Disconnect all the DSM connectors.
- Repair:
  - ♦ corrosion (replace connector or terminals - clean module pins)
  - ♦ damaged or bent pins - replace terminals/pins
  - ♦ pushed-out pins - replace pins as necessary
- Reconnect all the DSM connectors. Make sure they seat and latch correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new DSM . REFER to Section 501-10A .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test R: The HVAC Module Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 54 , Manual Climate Control System for schematic and connector information.

Refer to Wiring Diagrams Cell 55 , Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

The HVAC module communicates with the scan tool through the Medium Speed Controller Area Network (MS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- HVAC module

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 71 (10A) is OK

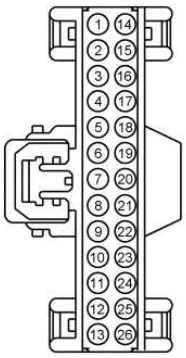
PINPOINT TEST R: THE HVAC MODULE DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>R1 CHECK THE HVAC MODULE VOLTAGE SUPPLY CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>• Disconnect: HVAC Module 2357A (EMTC).
• Disconnect: HVAC Module 2357B (EMTC) or C228B (DATC).
• Ignition ON.
• For EMTC , measure the voltage between:
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
</table></td><td>Yes
GO to R2 .

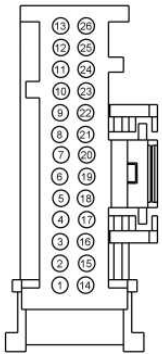
No
VERIFY the BCM fuse 71 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.</td></tr>
</table>

C2357A-14	SBP27 (BU/RD)	-	Ground



- For DATC , measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C228B-14	SBP71 (WH/RD)	-	Ground



- **Is the voltage greater than 11 volts?**

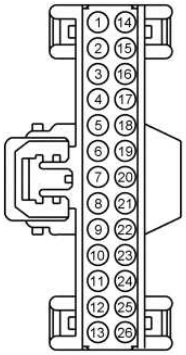
R2 CHECK THE HVAC MODULE GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- For EMTC , measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2357A-18	GD133 (BK)	-	Ground

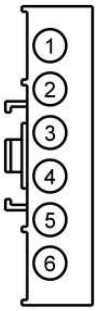
Yes
GO to R3 .

No
REPAIR the affected circuit.



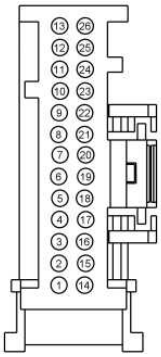
- For EMTC , measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2357B-5	GD138 (BK/WH)	-	Ground



- For DATC , measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C228B-6	GD133 (BK)	-	Ground

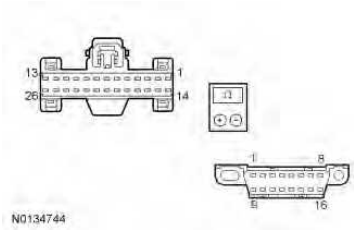


- **Is the resistance less than 3 ohms?**

R3 CHECK THE MS-CAN CIRCUITS BETWEEN THE HVAC MODULE AND THE DLC FOR AN OPEN

- For EMTC , measure the **resistance** between:

Positive ad		Negative Lead	
Pin	Circuit	Pin	Circuit
C2357A-13	VDB06 (GY/OG)	C251-3	VDB06 (GY/OG)
C2357A-26	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)

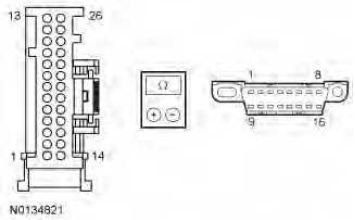


- For DATC , measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C228B-18	VDB06 (GY/OG)	C251-3	VDB06 (GY/OG)
C228B-19	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)

Yes
GO to R4 .

No
REPAIR the affected circuit.

 • **Are the resistances less than 3 ohms?**	
R4 CHECK FOR CORRECT HVAC MODULE OPERATION	
• Ignition OFF. • Disconnect the HVAC module connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the HVAC module connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new HVAC module. REFER to Section 412-00A or Section 412-00B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test S: The Audio Digital Signal Processing (DSP) Module Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 130 , Audio System/Navigation for schematic and connector information.

Normal Operation and Fault Conditions

The audio Digital Signal Processing (DSP) module communicates with the scan tool through the High Speed Controller Area Network (HS-CAN). The IPC is used as a gateway module.

Possible Sources

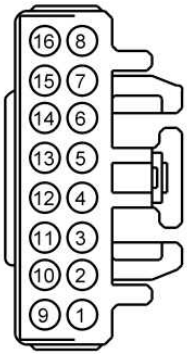
- Fuse
- Wiring, terminals or connectors
- DSP

Visual Inspection and Diagnostic Pre-checks

Verify RJB fuse 23 (25A) is OK.

PINPOINT TEST S: THE AUDIO DSP MODULE DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

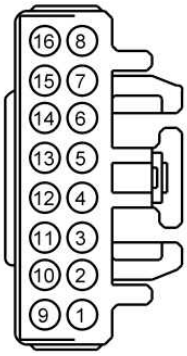
<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>S1 CHECK THE AUDIO DSP MODULE VOLTAGE SUPPLY CIRCUITS FOR AN OPEN</td><td></td></tr>
<tr><td>
• Ignition OFF.
• Disconnect: Audio DSP Module C4326C.
• Ignition ON.
• Measure the voltage between:
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C4326C-5</td><td>SME23 (VT/RD)</td><td>-</td><td>Ground</td></tr>
<tr><td>C4326C-6</td><td>SME23 (VT/RD)</td><td>-</td><td>Ground</td></tr>
</table>


• Are the voltages greater than 11 volts?
</td><td>
Yes
GO to S2 .

No
VERIFY the RJB fuse 23 (25A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.
</td></tr>
<tr><td>S2 CHECK THE AUDIO DSP MODULE GROUND CIRCUITS FOR AN OPEN</td><td></td></tr>
<tr><td>
• Ignition OFF.
• Disconnect: Negative Battery Cable.
• Measure the resistance between:
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C4326C-13</td><td>GD180 (VT/RD)</td><td>-</td><td>Ground</td></tr>
</table>
</td><td>
Yes
GO to S3 .

No
REPAIR the affected circuit.
</td></tr>
</table>

C4326C-14	GD180 (VT/RD)	-	Ground

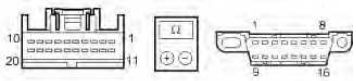


- **Are the resistances less than 3 ohms?**

S3 CHECK THE I-CAN CIRCUITS BETWEEN THE AUDIO DSP MODULE AND THE DLC FOR AN OPEN

- Disconnect: Audio DSP Module C4326A.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4326A-1	VDB13 (BU/GY)	C251-1	VDB13 (BU/GY)
C4326A-11	VDB14 (VT/GY)	C251-8	VDB14 (VT/GY)



N0134820

- **Are the resistances less than 3 ohms?**

Yes
GO to S4 .

No
REPAIR the affected circuit.

S4 CHECK FOR CORRECT AUDIO DSP MODULE OPERATION

- Disconnect all the audio DSP module connectors.
- Repair:
  - ♦ corrosion (replace connector or terminals - clean module pins)
  - ♦ damaged or bent pins - replace terminals/pins
  - ♦ pushed-out pins - replace pins as necessary

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new audio DSP module. Refer to the appropriate section in Group 415 for the procedure.

No
The system is operating correctly at this time. The concern may have been caused by module

• Reconnect all the audio DSP module connectors. Make sure they seat and latch correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test T: The Headlamp Control Module (HCM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 91 , Cornering Lamps for schematic and connector information.

Normal Operation and Fault Conditions

The Headlamp Control Module (HCM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- HCM

Visual Inspection and Diagnostic Pre-checks

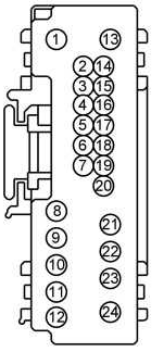
Verify BJB fuses 39 (5A) and 43 (15A) are OK.

PINPOINT TEST T: THE HCM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
T1 CHECK THE HCM VOLTAGE SUPPLY CIRCUITS FOR AN OPEN	
• Ignition OFF. • Disconnect: HCM C2129. • Ignition ON. • Measure the **voltage** between:	**Yes** GO to T2 . **No** VERIFY the BJB fuse 39 (5A) or 43 (15A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the

Positive Lead		Negative Lead				
Pin	Circuit	Pin	Circuit			
C2129-9	CBB43 (GY)	-	C2129-10	CBB39 (VT/WH)	-	Ground



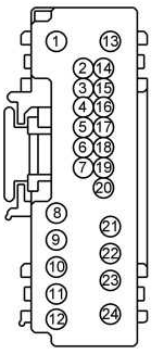
- **Are the voltages greater than 11 volts?**

circuit short.

T2 CHECK THE HCM GROUND CIRCUITS FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin Circuit	Pin	Circuit	
C2129-11	GD138 (BK/WH)	-	Ground



- **Is the resistance less than 3 ohms?**

Yes
GO to T3 .

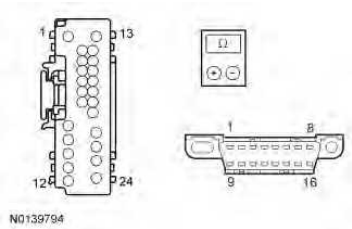
No
REPAIR the affected circuit.

T3 CHECK THE HS-CAN CIRCUITS BETWEEN THE HCM AND THE DLC FOR AN OPEN

<table>
<tr><td>

- Disconnect: HCM C2129.
- Measure the **resistce** between:

<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C2129-3</td><td>VDB04 (WH/BU)</td><td>C251-6</td><td>VDB04 (WH/BU)</td></tr>
<tr><td>C2129-2</td><td>VDB05 (WH)</td><td>C251-14</td><td>VDB05 (WH)</td></tr>
</table>



- **Are the resistances less than 3 ohms?**

</td><td>

Yes
GO to T4 .

No
REPAIR the affected circuit.

</td></tr>
<tr><td>T4 CHECK FOR CORRECT HCM OPERATION</td><td></td></tr>
<tr><td>

- Disconnect all the HCM connectors.
- Repair:
  - ♦ corrosion (replace connector or terminals - clean module pins)
  - ♦ damaged or bent pins - replace terminals/pins
  - ♦ pushed-out pins - replace pins as necessary
- Reconnect all the HCM connectors. Make sure they seat and latch correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

</td><td>

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new HCM . REFER to Section 417-01 .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

</td></tr>
</table>

Pinpoint Test U: The Driver Door Module (DDM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 56 , Heated Window for schematic and connector information.

Refer to Wiring Diagrams Cell 100 , Power Windows for schematic and connector information.

Refer to Wiring Diagrams Cell 110 , Power Door Locks for schematic and connector information.

Refer to Wiring Diagrams Cell 124 , Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

The Driver Door Module (DDM) communicates with the scan tool through the Medium Speed Controller Area Network (MS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- DDM

Visual Inspection and Diagnostic Pre-checks

Verify RJB fuse 4 (25A) is OK.

PINPOINT TEST U: THE DDM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>U1 CHECK THE DDM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>

- Ignition OFF.
- Disconnect: DDM C501A.
- Ignition ON.
- Measure the **voltage** between:

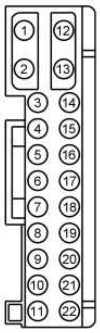
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C501A-2</td><td>SBR04 (GN/RD)</td><td>-</td><td>Ground</td></tr>
</table>

</td><td>

Yes
GO to U2 .

No
VERIFY the RJB fuse 4 (25A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

</td></tr>
</table>

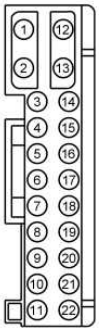


- **Is the voltage greater than 11 volts?**

U2 CHECK THE DDM GROUND CIRCUIT FOR AN OPEN

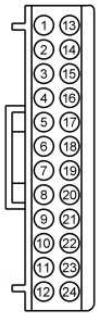
- Ignition OFF.
- Disconnect: DDM C501B.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C501A-13	GD134 (BK/VT)	-	



- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C501B-16	GD135 (BK/VT)	-	Ground



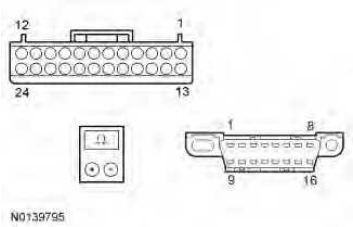
- **Is the resistance less than 3 ohms?**

Yes
GO to U3 .

No
REPAIR the affected circuit. **U3 CHECK THE MS-CAN CIRCUITS BETWEEN THE DDM AND THE DLC FOR AN OPEN**

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C501B-1	VDB06 (BK)	C251-3	VDB06 (GY/OG)
C501B-13	VDB07 (BK)	C251-11	VDB07 (VT/OG)



- **Are the resistances less than 3 ohms?**

Yes
GO to U4 .

No
REPAIR the affected circuit. **U4 CHECK FOR CORRECT DDM OPERATION**

- Disconnect all the DDM connectors.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)
  - damaged or bent pins - replace terminals/pins
  - pushed-out pins - replace pins as necessary
- Reconnect all the DDM connectors. Make sure they seat and latch correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new DDM . REFER to Section 501-14B .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test V: The Passenger Door Module (PDM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 56 , Heated Window for schematic and connector information.

Refer to Wiring Diagrams Cell 100 , Power Windows for schematic and connector information.

Refer to Wiring Diagrams Cell 110 , Power Door Locks for schematic and connector information.

Refer to Wiring Diagrams Cell 124 , Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

The Passenger Door Module (PDM) communicates with the scan tool through the Medium Speed Controller Area Network (MS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- PDM

Visual Inspection and Diagnostic Pre-checks

Verify RJB fuse 5 (25A) is OK.

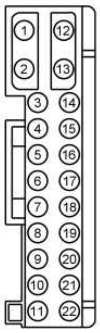
PINPOINT TEST V: THE PDM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
V1 CHECK THE PDM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN	

- Ignition OFF.
- Disconnect: PDM C652A.
- Ignition ON.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C652A-2	SBR05 (GY/RD)	-	Ground



- **Is the voltage greater than 11 volts?**

Yes
GO to V2 .

No
VERIFY the RJB fuse 5 (25A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

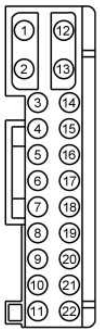
V2 CHECK THE PDM GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

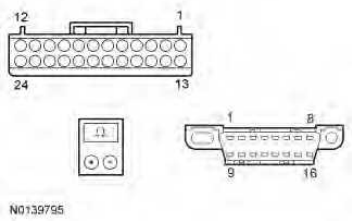
Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C652A-13	GD140 (BK/VT)	-	Ground

Yes
GO to V3 .

No
REPAIR the affected circuit.



- **Is the resistance less than 3 ohms?**

V3 CHECK THE MS-CAN CIRCUITS BETWEEN THE PDM AND THE DLC FOR AN OPEN	
• Disconnect: C652B. • Measure the **resistance** between: (Positive Lead: C652B-1, VDB06 (BK); C652B-13, VDB07 (BK) — Negative Lead: C251-3, VDB06 (GY/OG); C251-11, VDB07 (VT/OG))  • **Are the resistances less than 3 ohms?**	**Yes** GO to V4 . **No** REPAIR the affected circuit.
V4 CHECK FOR CORRECT PDM OPERATION	
• Disconnect all the PDM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the PDM connectors. Make sure they seat and latch correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new PDM . REFER to Section 501-14B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test W: The Liftgate/Trunk Module (LTM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 109 , Power Liftgate for schematic and connector information.

Normal Operation and Fault Conditions

The Liftgate/Trunk Module (LTM) communicates with the scan tool through the Medium Speed Controller Area Network (MS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- LTM

Visual Inspection and Diagnostic Pre-checks

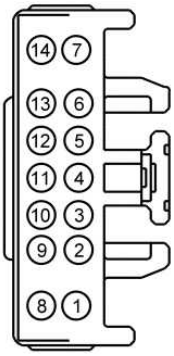
Verify RJB fuse 25 (25A) is OK.

PINPOINT TEST W: THE LTM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>W1 CHECK THE LTM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>• Ignition OFF.
• Disconnect: LTM C4174A.
• Ignition ON.
• Measure the voltage between:
<table><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr><tr><td>C4174A-1</td><td>SBR25 (RD)</td><td>-</td><td>Ground</td></tr></table></td><td>Yes
GO to W2 .

No
VERIFY the RJB fuse 25 (25A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.</td></tr>
</table>

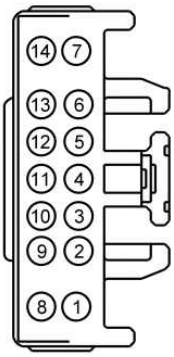


- **Is the voltage greater than 11 volts?**

W2 CHECK THE LTM GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4174A-8	GD150 (BK/WH)	-	Ground



- **Is the resistance less than 3 ohms?**

Yes
GO to W3 .

No
REPAIR the affected circuit.

W3 CHECK THE MS-CAN CIRCUITS BETWEEN THE LTM AND THE DLC FOR AN OPEN

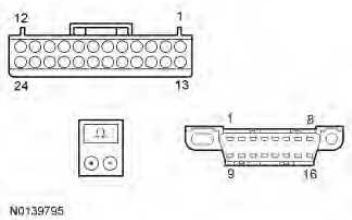
- Disconnect: LTM C4174B.
- Measure th **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4174B-24	VDB06 (BK)	C251-3	VDB06 (GY/OG)

Yes
GO to W4 .

No
REPAIR the affected circuit.

C4174B-12	VDB07 (BK)	C251-11	VDB07 (VT/OG)



- **Are the resistances less than 3 ohms?**

W4 CHECK FOR CORRECT LTM OPERATION	
• Disconnect all the LTM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the LTM connectors. Make sure they seat and latch correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new LTM . REFER to Section 501-03 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test X: The Image Processing Module - B (IPM-B) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 131 , Parking Aid for schematic and connector information.

Normal Operation and Fault Conditions

The IPM-B communicates with the scan tool through the Medium Speed Controller Area Network (MS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- IPM-B

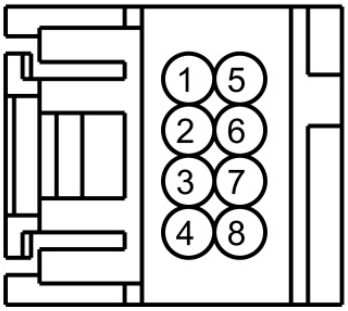
Visual Inspection and Diagnostic Pre-checks

Verify RJB fuse 29 (5A) is OK.

PINPOINT TEST X: THE IPM-B DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed results in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>X1 CHECK THE IPM-B VOLTAGE SUPPLY CIRCUITS FOR AN OPEN</td><td></td></tr>
<tr><td>• Ignition OFF.
• Disconnect: IPM-B C4402.
• Ignition ON.
• Measure the voltage between:

<table><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr><tr><td>C4402-4</td><td>CBR99 (BU)</td><td>-</td><td>Ground</td></tr></table>
 

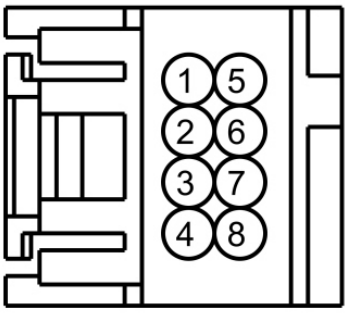
• Is the voltage greater than 11 volts?</td><td>Yes
GO to X2 .

No
VERIFY the RJB fuse 29 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.</td></tr>
<tr><td>X2 CHECK THE IPM-B GROUND CIRCUIT FOR AN OPEN</td><td></td></tr>
<tr><td>• Ignition OFF.
• Disconnect: Negative Battery Cable.
• Measure the resistance between:

<table><tr><th>sitive Lead</th><th>Negative Lead</th></tr></table></td><td>Yes
GO to X3 .

No
REPAIR the affected circuit.</td></tr>
</table>

Pin	Circuit	Pin	Circuit
C4402-1	GD152 (BK/BU)	-	Ground

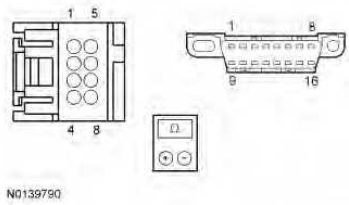


- **Is the resistance less than 3 ohms?**

X3 CHECK THE HS-CAN CIRCUITS BETWEEN THE IPM-B AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4402-2	VDB06 (GY/OG)	C251-3	VDB06 (GY/OG)
C4402-3	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)



- **Are the resistances less than 3 ohms?**

Yes
GO to X4 .

No
REPAIR the affected circuit.

X4 CHECK FOR CORRECT IPM-B OPERATION

- Disconnect all the IPM-B connectors.
- Repair:
  - ♦ corrosion (replace connector or terminals - clean module pins)
  - ♦ damaged or bent pins - replace terminals/pins

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new IPM-B . REFER to Section 413-13B .

No

♦ pushed-out pins - replace pins as necessary • Reconnect all the IPM-B connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test Y: The Trailer Module (TRM) Does Not Respond To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Refer to Wiring Diagrams Cell 95 , Trailer/Camper Adapter for schematic and connector information.

Normal Operation and Fault Conditions

The TRM communicates with the scan tool through the High Speed Controller Area Network (HS-CAN).

Possible Sources

- Fuse
- Wiring, terminals or connectors
- TRM

Visual Inspection and Diagnostic Pre-checks

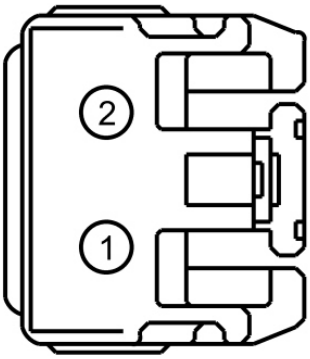
Verify RJB fuse 26 (40A) is OK.

PINPOINT TEST Y: THE TRM DOES NOT RESPOND TO THE SCAN TOOL

NOTE: Failure to disconnect the battery when instructed results in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
Y1 CHECK THE TRM VOLTAGE SUPPLY CIRCUITS FOR AN OPEN	
• Ignition OFF. • Disconnect: TRM C4397A. • Ignition ON. • Measure the **voltage** between:	

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4397A-2	SBR11 (BU/RD)	-	Ground

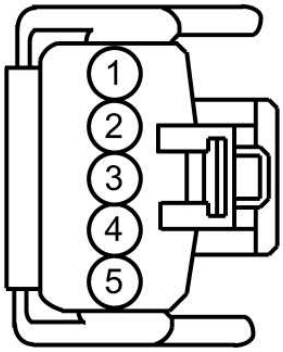


- **Is the voltage greater than 11 volts?**

Y2 CHECK THE TRM GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect: Negative Battery Cable.
- Disconnect: TRM C4397B.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4397B-4	GD152 (BK/BU)	-	Ground



- **Is the resistance less than 3 ohms?**

Yes
GO to Y3 .

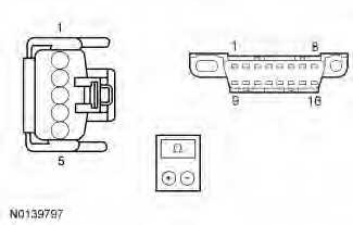
No
REPAIR the affected circuit.

Y3 CHECK THE HS-CAN CIRCUITS BETWEEN THE TRM AND THE DLC FOR AN OPEN

<table>
<tr><td>

- Measure the **resistance** between:

<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C4397B-1</td><td>VDB06 (GY/OG)</td><td>C251-3</td><td>VDB06 (GY/OG)</td></tr>
<tr><td>C4397B-2</td><td>VDB07 (VT/OG)</td><td>C251-11</td><td>VDB07 (VT/OG)</td></tr>
</table>



- **Are the resistances less than 3 ohms?**

</td><td>

Yes
GO to Y4 .

No
REPAIR the affected circuit.

</td></tr>
<tr><td>

Y4 CHECK FOR CORRECT TRM OPERATION

</td><td></td></tr>
<tr><td>

- Disconnect all the TRM connectors.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)
  - damaged or bent pins - replace terminals/pins
  - pushed-out pins - replace pins as necessary
- Reconnect all the TRM connectors. Make sure they are seated correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

</td><td>

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new TRM. REFER to Section 417-01 .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

</td></tr>
</table>

Pinpoint Test Z: No High Speed Controller Area Network (HS-CAN) Communication, All Modules Are Not Responding

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

Refer to Communications Network .

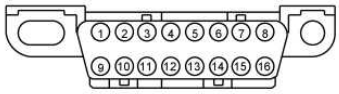
Possible Sources

- Wiring, terminals or connectors
- ABS module
- APIM (if equipped)
- BCM
- HCM (if equipped)
- OCSM
- PAM (if equipped)
- PCM
- PSCM
- RCM
- SASM

PINPOINT TEST Z: NO HS-CAN COMMUNICATION, ALL MODULES ARE NOT RESPONDING

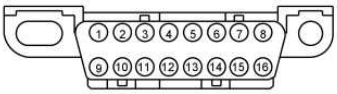
NOTE: Various modules set network DTCs during this test procedure. Clear DTCs from all modules after completing the diagnostic procedure.

NOTE: Failure to disconnect the battery when instructed results in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
Z1 CHECK THE DLC PINS FOR DAMAGE	
• Ignition OFF. • Disconnect the scan tool cable from the Data Link Connector (DLC). • Inspect the DLC pins 6 and 14 for damage.  • **Are DLC pins 6 and 14 OK?**	**Yes** GO to Z2 . **No** REPAIR the DLC as necessary.
Z2 CHECK THE HS-CAN TERMINATION RESISTANCE	

- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	C251-14	VDB05 (WH)



- **Is the resistance between 54 and 66 ohms?**

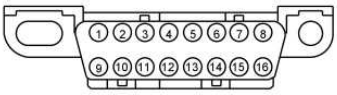
Yes
GO to Z3 .

No
GO to Z5 .

Z3 CHECK THE HS-CAN (+) AND HS-CAN (-) CIRCUITS FOR A SHORT TO GROUND

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	-	Ground
C251-14	VDB05 (WH)	-	Ground



- **Are the resistances greater than 1,000 ohms?**

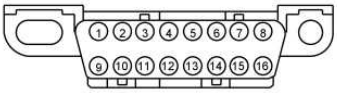
Yes
GO to Z4 .

No
GO to Z12 .

Z4 CHECK THE HS-CAN (+) AND HS-CAN (-) CIRCUITS FOR A SHORT TO VOLTAGE

- Connect the negative battery cable.
- Ignition ON.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	-	Ground
C251-14	VDB05 (WH)	-	Ground



- **Are the voltages greater than 6 volts?**

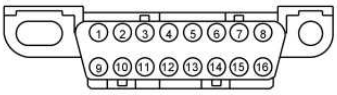
Yes
REPAIR the affected circuit.

No
GO to Z13 .

Z5 CHECK THE HS-CAN TERMINATION RESISTOR

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	C251-14	VDB05 (WH)



- **Is the resistance between 108 and 132 ohms?**

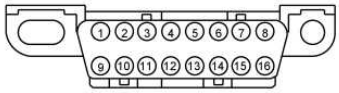
Yes
GO to Z6 .

No
GO to Z9 .

Z6 CHECK THE HS-CAN TERMINATION RESISTOR WITH THE PCM DISCONNECTED

- Disconnect: PCM C175B (2.5L), C1381B (2.0L) or C1551B (1.6L).
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	C251-14	VDB05 (WH)



- **Is the resistance between 108 and 132 ohms?**

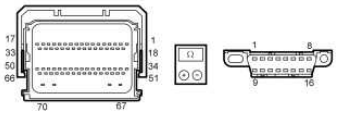
Yes
GO to Z7 .

No
GO to Z8 .

Z7 CHECK THE HS-CAN CIRCUITS BETWEEN THE PCM AND THE DLC FOR AN OPEN

- For 2.5L, measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C175B-59	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C175B-58	VDB05 (WH)	C251-14	VDB05 (WH)



N0134727

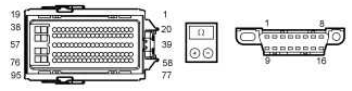
- For 2.0L, measure the **resistance** between:

Positive Lead	Negative Lead

Yes
GO to Z28 .

No
REPAIR the affected circuit.

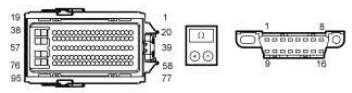
Pin	Circuit	Pin	Circuit
C1381B-69	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C1381B-68	VDB05 (WH)	C251-14	VDB05 (WH)



N0134728

- For 1.6L, measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C1551B-69	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C1551B-68	VDB05 (WH)	C251-14	VDB05 (WH)



N0134728

- **Are the resistances less than 3 ohms?**

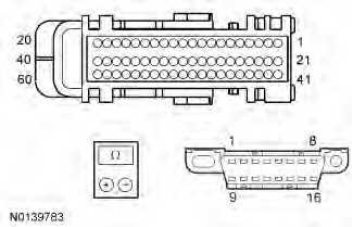
Z8 CHECK THE HS-CAN CIRCUITS BETWEEN THE BCM AND THE DLC FOR AN OPEN

- Disconnect: BCM C2280C.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2280C-7	VDB04 (WH/BU)	C251-6	VDB04 (WH/BU)
C2280C-8	VDB05 (WH)	C251-14	VDB05 (WH)

Yes
GO to Z24 .

No
REPAIR the affected circuit.

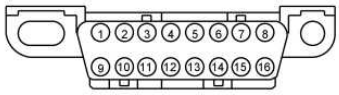


- **Are the resistances less than 3 ohms?**

Z9 CHECK THE HS-CAN (+) AND HS-CAN (-) CIRCUITS FOR A SHORT TOGETHER

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	C251-14	VDB05 (WH)



- **Is the resistance less than 3 ohms?**

Yes
GO to Z11 .

No
GO to Z10 .

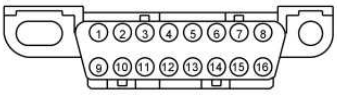
Z10 CHECK THE HS-CAN (+) AND HS-CAN (-) CIRCUITS FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	C251-14	VDB05 (WH)

Yes
REPAIR the DLC or REPAIR the affected circuit.

No
A capacitor internal to a module may still be draining, causing irregular resistance readings. WAIT 5 minutes. REPEAT the pinpoint test.

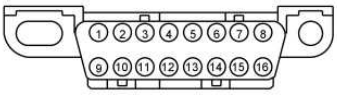


- **Is the resistance greater than 10,000 ohms?**

Z11 CHECK THE HS-CAN (+) AND HS-CAN (-) CIRCUITS FOR A SHORT TOGETHER WITH THE MODULES DISCONNECTED

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	C251-14	VDB05 (WH)



- Disconnect the following modules one at a time until resistance is greater than 3 ohms.
  - APIM C3342 (4.2-inch screen) C2383 (8-inch touchscreen)
  - ABS module C135
  - BCM C2280C
  - HCM C2129
  - OCSM C3159
  - PAM C4014 (if equipped)
  - PCM C175B (2.5L), C1381B (2.0L) or C1551B (1.6L)
  - PSCM C1463A
  - RCM C310B
  - SASM C226A
- **Did the resistance change to greater than 5 ohms with one of the modules disconnected?**

Yes
For the APIM , GO to Z22 . For the ABS module, GO to Z23 . For the BCM , GO to Z24 . For the HCM , GO to Z25 . For the OCSM , GO to Z26 . For the PAM , GO to Z27 . For the PCM, GO to Z28 . For the PSCM , GO to Z29 . For the RCM , GO to Z30 . For the SASM , GO to Z31 .

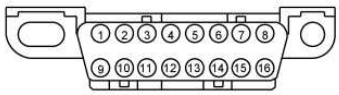
No
REPAIR the affected circuits.

Z12 CHECK THE HS-CAN (+) AND HS-CAN (-) CIRCUITS FOR A SHORT TO GROUND WITH THE MODULES

DISCONNECTED

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-6	VDB04 (WH/BU)	C251-14	VDB05 (WH)



- Disconnect the following modules one at a time until resistance is greater than 1,000 ohms.
  - APIM C3342 (4.2-inch screen) C2383 (8-inch touchscreen)
  - ABS module C135
  - BCM C2280C
  - HCM C2129
  - OCSM C3159
  - PAM C4014 (if equipped)
  - PCM C175B (2.5L), C1381B (2.0L) or C1551B (1.6L)
  - PSCM C1463A
  - RCM C310B
  - SASM C226A
- **Did the resistance change to greater than 1,000 ohms with one of the modules disconnected?**

Yes
For the APIM , GO to Z22 . For the ABS module, GO to Z23 . For the BCM , GO to Z24 . For the HCM , GO to Z25 . For the OCSM , GO to Z26 . For the PAM , GO to Z27 . For the PCM, GO to Z28 . For the PSCM , GO to Z29 . For the RCM , GO to Z30 . For the SASM , GO to Z31 .

No
REPAIR the affected circuit. CONNECT all modules.

Z13 CHECK FOR RESTORED COMMUNICATION WITH THE PCM DISABLED

NOTE: Establish an IDS session prior to disabling the PCM in this test step. If the PCM has failed communication during multiple attempts to identify the vehicle, first identify the vehicle manually by entering a PCM part number, calibration number or tear tag when prompted by IDS .

NOTE: When a vehicle is manually identified by a PCM part number, calibration number or tear tag, the IDS does not automatically run a network test. Manually select and run the Network Test.

Yes
INSTALL the removed fuses. GO to Pinpoint Test A .

No
INSTALL the removed fuses. GO to Z14 .

NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: Battery Junction Box (BJB) Fuses 12 (30A), 26 (5A) (2.5L) and 32 (5A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	
Z14 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE ABS MODULE DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: BJB Fuses 7 (40A), 8 (30A) and 19 (15A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	**Yes** INSTALL the removed fuses. GO to Pinpoint Test B . **No** INSTALL the removed fuses. GO to Z15 .
Z15 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE OCSM , APIM AND THE RCM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: BCM Fuses 37 (10A), 67 (7.5A) and 86 (10A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	**Yes** INSTALL the removed fuses. GO to Z16 . **No** INSTALL the removed fuses. GO to Z17 .
Z16 CHECK FOR RESTORED COMMUNICATION WITH THE OCSM , APIM AND RCM DISCONNECTED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect modules one at a time until other HS-CAN modules pass the network test. Skip to the end once network operation is restored. • Disconnect: OCSM C3159. • Using a scan tool, perform the network test. • Disconnect: APIM C2383 (8-inch touchscreen) or C3342 (4.2-inch non-touchscreen) (if equipped). • Using a scan tool, perform the network test. • Disconnect: RCM C310B. • Using a scan tool, perform the network test. • **Do all other HS-CAN modules pass the network test?**	**Yes** CONNECT all modules. For restored operation with the RCM disconnected, GO to Pinpoint Test F . For restored operation with the OCSM disconnected, GO to Pinpoint Test G . For restored operation with the APIM disconnected, GO to Pinpoint Test K . **No** CONNECT all modules. The HS-CAN tests within specification. VERIFY the correct operation of the scan tool on a known good vehicle.

Z17 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE BCM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: High Current BJB Fuses 4 (50A) and 9 (50A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	**Yes** INSTALL the removed fuses. GO to Pinpoint Test C . **No** INSTALL the removed fuses. GO to Z18 .
Z18 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE SASM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: BCM Fuse 72 (7.5A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	**Yes** INSTALL the removed fuse. GO to Pinpoint Test H . **No** INSTALL the removed fuse. If equipped with parking aid, GO to Z19 . If not equipped with parking aid, GO to Z20 .
Z19 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE PAM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: RJB Fuse 30 (5A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	**Yes** INSTALL the removed fuse. GO to Pinpoint Test I . **No** INSTALL the removed fuse. GO to Z20 .
Z20 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE PSCM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: High Current BJB Fuses 1 (80A) and 40 (5A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	**Yes** INSTALL the removed fuse. GO to Pinpoint Test E . **No** INSTALL the removed fuse. If equipped with HID headlamps, GO to Z21 . If not equipped with HID headlamps, the HS-CAN tests within specification. VERIFY the correct operation of the scan tool on a known good vehicle.
Z21 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE HCM DISABLED	
	Yes INSTALL the removed fuses.

NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: BJB Fuses 39 (5A) and 43 (15A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	GO to Pinpoint Test T . **No** INSTALL the removed fuses. The HS-CAN tests within specification. VERIFY the correct operation of the scan tool on a known good vehicle.
Z22 CHECK THE APIM FOR CORRECT OPERATION	
• Disconnect the APIM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the APIM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new APIM . Refer to the appropriate section in Group 415 for the procedure. **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
Z23 CHECK THE ABS MODULE FOR CORRECT OPERATION	
• Disconnect the ABS module connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the ABS module connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new ABS module. REFER to Section 206-09 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
Z24 CHECK THE BCM FOR CORRECT OPERATION	
• Disconnect all the BCM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins)	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and

♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the BCM connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Section 419-10 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
Z25 CHECK THE HCM FOR CORRECT OPERATION	
• Disconnect the HCM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the HCM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new HCM . REFER to Section 417-01 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
Z26 CHECK THE OCSM FOR CORRECT OPERATION	
• Disconnect the OCSM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the OCSM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new OCSM . REFER to Section 501-20B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
Z27 CHECK THE PAM FOR CORRECT OPERATION	
• Disconnect the PAM connector. • Repair:	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern,

♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the PAM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new PAM . REFER to Section 413-13A . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
Z28 CHECK THE PCM FOR CORRECT OPERATION	
• Disconnect all the PCM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the PCM connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new PCM. REFER to Section 303-14 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
Z29 CHECK THE PSCM FOR CORRECT OPERATION	
• Disconnect all the PSCM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the PSCM connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new PSCM . REFER to Section 211-02 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
Z30 CHECK THE RCM FOR CORRECT OPERATION	
• Disconnect all the RCM connectors. • Repair:	**Yes** CHECK OASIS for any applicable TSBs. If a TSB

♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the RCM connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new RCM . REFER to Section 501-20B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
Z31 CHECK THE SASM FOR CORRECT OPERATION	
• Disconnect all the SASM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the SASM connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new SASM . REFER to Section 211-05 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test AA: No Medium Speed Controller Area Network (MS-CAN) Communication, All Modules Are Not Responding

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

Refer to Communications Network .

Possible Sources

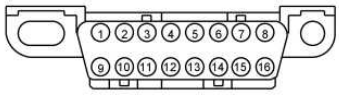
- Wiring, terminals or connectors
- APIM (if equipped)
- BCM

- DDM (if equipped)
- DSM (if equipped)
- GPSM (if equipped)
- HVAC module
- IPM-B (if equipped)
- IPC
- LTM (if equipped)
- PDM (if equipped)
- RFA module (if equipped)
- Trailer module (TRM) (if equipped)

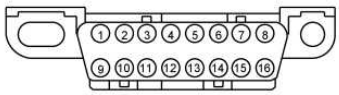
PINPOINT TEST AA: NO MS-CAN COMMUNICATION, ALL MODULES ARE NOT RESPONDING

NOTE: Various modules set network DTCs during this test procedure. Clear DTCs from all modules after completing the diagnostic procedure.

NOTE: Failure to disconnect the battery when instructed results in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
AA1 CHECK THE DLC PINS FOR DAMAGE	
• Ignition OFF. • Disconnect the scan tool cable from the Data Link Connector (DLC). • Inspect the DLC pins 3 and 11 for damage.  • **Are DLC pins 3 and 11 OK?**	**Yes** GO to AA2 . **No** REPAIR the DLC as necessary.
AA2 CHECK THE MS-CAN TERMINATION RESISTANCE	
• Disconnect: Negative Battery Cable. • Measure the **resistance** between: Positive Lead: Pin / Circuit Negative Lead: Pin / Circuit	**Yes** GO to AA3 . **No** GO to AA5 .

C251-3	VDB06 (GY/OG)	C251-11	VDB07 (VT/OG)

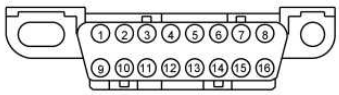


- **Is the resistance between 54 and 66 ohms?**

AA3 CHECK THE MS-CAN (+) AND MS-CAN (-) CIRCUITS FOR A SHORT TO GROUND

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-3	VDB06 (GY/OG)	-	Ground
C251-11	VDB07 (VT/OG)	-	Ground



- **Are the resistances greater than 1,000 ohms?**

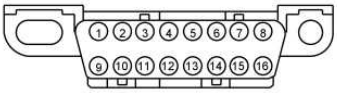
Yes
GO to AA4 .

No
GO to AA12 .

AA4 CHECK THE MS-CAN (+) AND MS-CAN (-) CIRCUITS FOR A SHORT TO VOLTAGE

- Connect the negative battery cable.
- Ignition ON.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-3	VDB06 (GY/OG)	-	Ground
C251-11	VDB07 (VT/OG)	-	Ground



- **Are the voltagreater than 6 volts?**

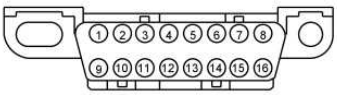
Yes
REPAIR the affected circuit.

No
GO to AA13 .

AA5 CHECK THE MS-CAN TERMINATION RESISTOR

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-3	VDB06 (GY/OG)	C251-11	VDB07 (VT/OG)



Yes
GO to AA6 .

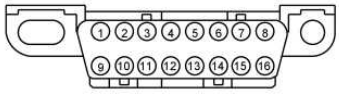
No
GO to AA9 .

- **Is the resistance between 108 and 132 ohms?**

AA6 CHECK THE MS-CAN TERMINATION RESISTOR WITH THE BCM DISCONNECTED

- Disconnect: BCM C2280A.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-3	VDB06 (GY/OG)	C251-11	VDB07 (VT/OG)



- **Is the resistance between 108 and 132 ohms?**

Yes
GO to AA7 .

No
GO to AA8 .

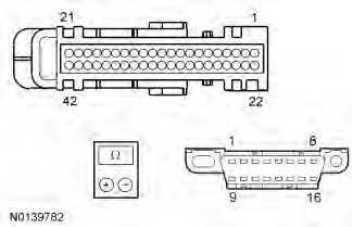
AA7 CHECK THE MS-CAN CIRCUITS BETWEEN THE BCM AND THE DLC FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2280A-41	VDB06 (GY/OG)	C251-3	VDB06 (GY/OG)
C2280A-40	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)

Yes
GO to AA26 .

No
REPAIR the affected circuit.

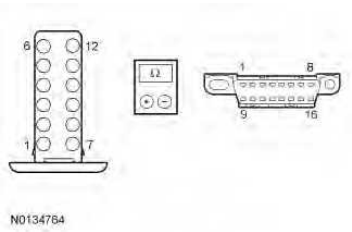


- **Are the resistances less than 3 ohms?**

AA8 CHECK THE MS-CAN CIRCUITS BETWEEN THE IPC AND THE DLC FOR AN OPEN

- Disconnect: IPC C220.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C220-2	VDB06 (GY/OG)	C251-3	VDB06 (GY/OG)
C220-1	VDB07 (VT/OG)	C251-11	VDB07 (VT/OG)



- **Are the resistances less than 3 ohms?**

Yes
GO to AA32 .

No
REPAIR the affected circuit.

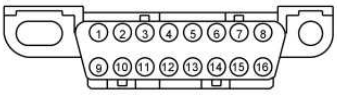
AA9 CHECK THE MS-CAN (+) AND MS-CAN (-) CIRCUITS FOR A SHORT TOGETHER

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-3	VDB06 (GY/OG)	C251-11	VDB07 (VT/OG)

Yes
GO to AA11 .

No
GO to AA10 .

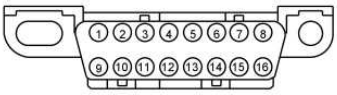


- **Is the resistance less than 3 ohms?**

AA10 CHECK THE MS-CAN (+) AND MS-CAN (-) CIRCUITS FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-3	VDB06 (GY/OG)	C251-11	VDB07 (VT/OG)



- **Is the resistance greater than 10,000 ohms?**

Yes
REPAIR the DLC or REPAIR the affected circuit.

No
A capacitor internal to a module may still be draining, causing irregular resistance readings. WAIT 5 minutes. REPEAT the pinpoint test.

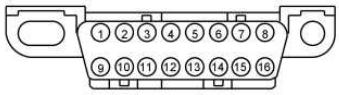
AA11 CHECK THE MS-CAN (+) AND MS-CAN (-) CIRCUITS FOR A SHORT TOGETHER WITH THE MODULES DISCONNECTED

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-3	VDB06 (GY/OG)	C251-11	VDB07 (VT/OG)

Yes
For the APIM , GO to AA25 . For the BCM , GO to AA26 . For the DDM , GO to AA27 . For the DSM , GO to AA28 . For the GPSM , GO to AA29 . For the HVAC module, GO to AA30 . For the IPM-B , GO to AA31 . For the IPC , GO to AA32 . For the LTM , GO to AA33 . For the PDM , GO to AA35 . For the RFA module, GO to AA34 . For the TRM, GO to AA36 .

No
REPAIR circuits for a short together. CONNECT all modules.



- Disconnect the following modules one at a time until the resistance is greater than 3 ohms.
  - APIM C2383 (if equipped)
  - BCM C2280A
  - DDM C501B
  - DSM C341D (if equipped)
  - GPSM C2398 (if equipped)
  - HVAC module C2357A (EMTC) or C228B (DATC)
  - IPM-B C4402 (if equipped)
  - IPC C220
  - LTM C4174B (if equipped)
  - RFA module C4392D (if equipped)
  - PDM C652B (if equipped)
  - TRM C4397B (if equipped)
- **Did the resistance change to greater than 3 ohms with one of the modules disconnected?**

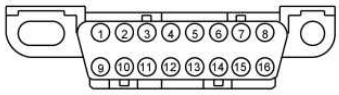
AA12 CHECK THE MS-CAN (+) AND MS-CAN (-) CIRCUITS FOR A SHORT TO GROUND WITH THE MODULES DISCONNECTED

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-3	VDB06 (GY/OG)	-	Ground
C251-11	VDB07 (VT/OG)	-	Ground

Yes
For the APIM , GO to AA25 . For the BCM , GO to AA26 . For the DDM , GO to AA27 . For the DSM , GO to AA28 . For the GPSM , GO to AA29 . For the HVAC module, GO to AA30 . For the IPM-B , GO to AA31 . For the IPC , GO to AA32 . For the LTM , GO to AA33 . For the PDM , GO to AA35 . For the RFA module, GO to AA34 . For the TRM, GO to AA36 .

No
REPAIR the affected circuit.

 • Disconnect the following modules one at a time until the resistance is greater than 1,000 ohms. ♦ APIM C2383 (if equipped) ♦ BCM C2280A ♦ C501B ♦ DSM C341D (if equipped) ♦ GPSM C2398 (if equipped) ♦ HVAC module C2357A (EMTC) or C228B (DATC) ♦ IPM-B C4402 (if equipped) ♦ IPC C220 ♦ LTM C4174B (if equipped) ♦ RFA module C4392D (if equipped) ♦ PDM C652B (if equipped) ♦ TRM C4397B (if equipped) • **Did the resistance change to greater than 1,000 ohms with one of the modules disconnected?**	
AA13 CHECK FOR RESTORED COMMUNICATION WITH THE BCM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: High Current BJB Fuses 4 (50A) and 9 (50A). • Using a scan tool, perform the network test. • **Do all other MS-CAN modules pass the network test?**	**Yes** INSTALL the removed fuses. GO to Pinpoint Test C . **No** INSTALL the removed fuses. If the vehicle is equipped with GPS or SYNC®, GO to AA14 . If not equipped with GPS or SYNC®, GO to AA16 .
AA14 CHECK FOR RESTORED COMMUNICATION WITH THE GPSM AND THE APIM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: BCM Fuse 67 (7.5A).	**Yes** INSTALL the removed fuse. GO to AA15 . **No** INSTALL the removed fuse. GO to AA16 .

• Using a scan tool, perform the network test. • **Do all other MS-CAN modules pass the network test?**	
AA15 CHECK FOR RESTORED COMMUNICATION WITH THE GPSM AND THE APIM DISCONNECTED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect modules one at a time until other MS-CAN modules pass the network test. Skip to the end once network operation is restored. • Disconnect: BCM Fuse 69 (5A). • Using a scan tool, perform the network test. • **Do all other MS-CAN modules pass the network test?**	**Yes** INSTALL the removed fuse. For restored operation with the GPSM disconnected, GO to Pinpoint Test O . For restored operation with the APIM disconnected, GO to Pinpoint Test K . **No** INSTALL the removed fuse. GO to AA16 .
AA16 CHECK FOR RESTORED COMMUNICATION WITH THE IPC DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: BCM Fuse 69 (5A). • Using a scan tool, perform the network test. • **Do all other MS-CAN modules pass the network test?**	**Yes** INSTALL removed fuse. GO to Pinpoint Test D . **No** INSTALL removed fuse. GO to AA17 .
AA17 CHECK FOR RESTORED COMMUNICATION WITH THE DDM AND PDM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: RJB Fuses 4 (25A) and 5 (25A). • Using a scan tool, perform the network test. • **Do all other MS-CAN modules pass the network test?**	**Yes** INSTALL removed fuses. GO to AA18 . **No** INSTALL removed fuses. GO to AA19 .
AA18 CHECK FOR RESTORED COMMUNICATION WITH THE DDM AND THE PDM DISCONNECTED	
NOTE: When re-running the network test, close the Network Test application first or the	**Yes** CONNECT all modules.

screen display reverts back to the prior run Network Test results. • Disconnect modules one at a time until other MS-CAN modules pass the network test. Skip to the end once network operation is restored. • Disconnect: DDM C501B. • Using a scan tool, perform the network test. • Disconnect: PDM C652B. • Using a scan tool, perform the network test. • **Do all other MS-CAN modules pass the network test?**	For restored operation with the DDM disconnected, GO to Pinpoint Test U . For restored operation with the PDM disconnected, GO to Pinpoint Test V . **No** CONNECT all modules. If the vehicle is equipped with a rear camera, GO to AA19 . If not equipped with a rear camera, GO to AA20 .
AA19 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE IPM-B DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: RJB Fuse 29 (5A). • Using a scan tool, perform the network test. • Repeat the network test. • **Do all other MS-CAN modules pass the network test?**	**Yes** INSTALL the removed fuse. GO to Pinpoint Test X . **No** INSTALL the removed fuses. GO to AA20 .
AA20 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE HVAC MODULE DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: BCM Fuse 71 (10A). • Using a scan tool, perform the network test. • Repeat the network test. • **Do all other modules pass the network test?**	**Yes** INSTALL the removed fuse. GO to Pinpoint Test R . **No** INSTALL the removed fuse. If equipped with power liftgate, GO to AA21 . If equipped with trailer tow, GO to AA22 . If not equipped with power liftgate or trailer tow, GO to AA23 .
AA21 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE LTM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: RJB Fuse 25 (25A).	**Yes** INSTALL the removed fuse. GO to Pinpoint Test W . **No** INSTALL the removed fuse. If equipped with trailer tow, GO to AA22 .

• Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	If not equipped with trailer tow, GO to AA23 .
AA22 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE TRM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: RJB fuse 26 (40A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	**Yes** INSTALL the removed fuse. GO to Pinpoint Test Y . **No** INSTALL the removed fuse. GO to AA23 .
AA23 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE DSM DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: RJB Fuses 9 (25A) and 10 (5A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	**Yes** INSTALL the removed fuses. GO to Pinpoint Test Q . **No** INSTALL the removed fuse. If equipped with RFA module, GO to AA24 . If not equipped with RFA module, the MS-CAN tests within specification. VERIFY the correct operation of the scan tool on a known good vehicle.
AA24 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE RFA MODULE DISABLED	
NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results. • Disconnect: RJB Fuses 2 (10A). • Using a scan tool, perform the network test. • **Do all other modules pass the network test?**	**Yes** INSTALL the removed fuse. GO to Pinpoint Test J . **No** INSTALL the removed fuse. The MS-CAN tests within specification. VERIFY the correct operation of the scan tool on a known good vehicle.
AA25 CHECK THE APIM FOR CORRECT OPERATION	
• Disconnect the APIM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins)	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new APIM . Refer to the appropriate section in Group 415 for

♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the APIM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	the procedure. **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
AA26 CHECK THE BCM FOR CORRECT OPERATION	
• Disconnect all the BCM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the BCM connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Section 419-10 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
AA27 CHECK THE DDM FOR CORRECT OPERATION	
• Disconnect all the DDM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the DDM connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new DDM . REFER to Section 501-14B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
AA28 CHECK THE DSM FOR CORRECT OPERATION	
• Disconnect all the DSM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new DSM . REFER to Section 501-10A . **No** The system is operating correctly at this time. The concern may have been caused by module

• Reconnect all the DSM connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	connections. ADDRESS the root cause of any connector or pin issues.
AA29 CHECK THE GPSM FOR CORRECT OPERATION	
• Disconnect the GPSM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the GPSM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new GPSM . Refer to the appropriate section in Group 415 for the procedure. **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
AA30 CHECK THE HVAC MODULE FOR CORRECT OPERATION	
• Disconnect all the HVAC module connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the HVAC module connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new HVAC module. REFER to Section 412-00A or Section 412-00B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
AA31 CHECK THE IPM-B FOR CORRECT OPERATION	
• Disconnect all the IPM-B connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the IPM-B connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new IPM-B . REFER to Section 413-13B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AA32 CHECK THE IPC FOR CORRECT OPERATION	
• Disconnect all the IPC connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the IPC connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new IPC . REFER to Section 413-01 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
AA33 CHECK THE LTM FOR CORRECT OPERATION	
• Disconnect all the LTM connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the LTM connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new LTM . REFER to Section 501-03 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
AA34 CHECK THE RFA MODULE FOR CORRECT OPERATION	
• Disconnect all the RFA module connectors. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Reconnect all the RFA module connectors. Make sure they are seated correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new RFA module. REFER to Section 419-10 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
AA35 CHECK THE PDM FOR CORRECT OPERATION	
• Disconnect the PDM connector. • Repair:	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this

♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the PDM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new PDM . REFER to Section 501-14B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
AA36 CHECK THE TRM FOR CORRECT OPERATION	
• Disconnect the TRM connector. • Repair: ♦ corrosion (replace connector or terminals - clean module pins) ♦ damaged or bent pins - replace terminals/pins ♦ pushed-out pins - replace pins as necessary • Connect the TRM connector. Make sure it seats and latches correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new TRM. REFER to Section 417-01 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test AB: No Infotainment Controller Area Network (I-CAN) Communication, All Modules Are Not Responding

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

Refer to Communications Network .

Possible Sources

- Wiring, terminals or connectors
- APIM (if equipped)
- ACM
- Audio DSP module (if equipped)
- FCIM
- FCDIM (if equipped)
- IPC

PINPOINT TEST AB: NO I-CAN COMMUNICATION, ALL MODULES ARE NOT RESPONDING

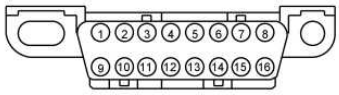
NOTE: Various modules set network DTCs during this test procedure. Clear DTCs from all modules after completing the diagnostic procedure.

NOTE: Failure to disconnect the battery when instructed results in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>AB1 CHECK THE I-CAN TERMINATION RESISTANCE</td><td></td></tr>
<tr><td>

- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C251-1</td><td>VDB13 (BU/GY)</td><td>C251-8</td><td>VDB14 (VT/GY)</td></tr>
</table>



- **Is the resistance between 54 and 66 ohms?**

</td><td>

Yes
GO to AB2 .

No
GO to AB4 .

</td></tr>
<tr><td>AB2 CHECK THE I-CAN (+) AND I-CAN (-) CIRCUITS FOR A SHORT TO GROUND</td><td></td></tr>
<tr><td>

- Measure the **resistance** between:

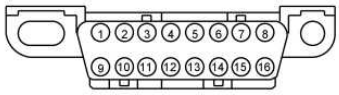
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C251-1</td><td>VDB13 (BU/GY)</td><td>-</td><td>Ground</td></tr>
<tr><td>VDB14 (VT/GY)</td><td>-</td><td>Ground</td><td></td></tr>
</table>

</td><td>

Yes
GO to AB3 .

No
GO to AB11 .

</td></tr>
</table>

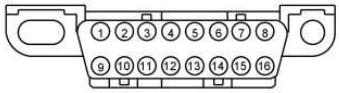


- **Are the resistances greater than 1,000 ohms?**

AB3 CHECK THE I-CAN (+) AND I-CAN (-) CIRCUITS FOR A SHORT TO VOLTAGE

- Connect the negative battery cable.
- Ignition ON.
- Measure the **voltage** between:

Positive Lead	Negative Lead		
Pin	Circuit	Pin	Circuit
C251-1	VDB13 (BU/GY)	-	Ground
C251-8	VDB14 (VT/GY)	-	Ground



- **Are the voltages greater than 6 volts?**

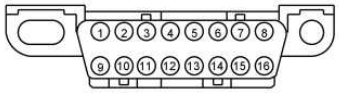
Yes
REPAIR the affected circuit.

No
GO to AB10 .

AB4 CHECK THE I-CAN TERMINATION RESISTOR

- Measure the **resistance** between:

Positive Lead			
Pin	Circuit	Pin	Circuit
C251-1	VDB13 (BU/GY)	C251-8	VDB14 (VT/GY)



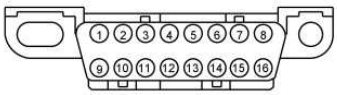
- **Is the resistance between 108 and 132 ohms?**

Yes
GO to AB5 .

No
GO to AB8 . **AB5 CHECK THE I-CAN TERMINATION RESISTOR WITH THE IPC DISCONNECTED**

- Disconnect: IPC C220.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-1	VDB13 (BU/GY)	C251-8	VDB14 (VT/GY)



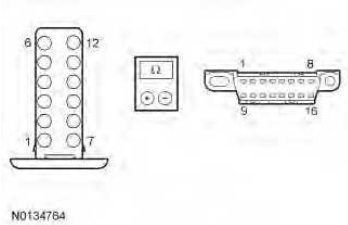
- **Is the resistance between 108 and 132 ohms?**

Yes
GO to AB6 .

No
GO to AB7 . **AB6 CHECK THE I-CAN CIRCUITS BETWEEN THE IPC AND THE DLC FOR AN OPEN**

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C220-5	VDB13 (BU/GY)	C251-1	VDB13 (BU/GY)
C220-4	VDB14 (VT/GY)	C251-8	VDB14 (VT/GY)



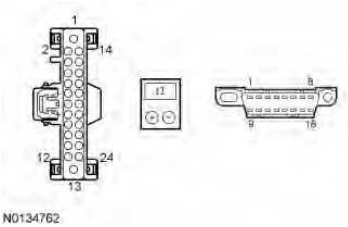
- **Are the resistances less than 3 ohms?**

Yes
GO to AB23 .

No
REPAIR the affected circuit. **AB7 CHECK THE I-CAN CIRCUITS BETWEEN THE ACM AND THE DLC FOR AN OPEN**

- Disconnect: Audio Front Control Module (ACM) C240A.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C240A-14	VDB13 (BU/GY)	C251-1	VDB13 (BU/GY)
C240A-15	VDB14 (VT/GY)	C251-8	VDB14 (VT/GY)



- **Are the resistances less than 3 ohms?**

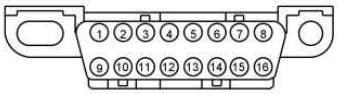
Yes
GO to AB19 .

No

REPAIR the affected circuit. **AB8 CHECK THE I-CAN (+) AND I-CAN (-) CIRCUITS FOR A SHORT TOGETHER**

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-1	VDB13 (BU/GY)	C251-8	VDB14 (VT/GY)



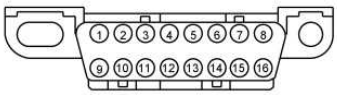
- **Is the resistance less than 3 ohms?**

Yes
GO to AB10 .

No
GO to AB9 . **AB9 CHECK THE I-CAN (+) AND I-CAN (-) CIRCUITS FOR AN OPEN**

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-1	VDB13 (BU/GY)	C251-8	VDB14 (VT/GY)



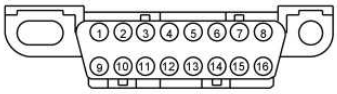
- **Is the resistance greater than 10,000 ohms?**

Yes
REPAIR the DLC or REPAIR the affected circuit.

No
A capacitor internal to a module may still be draining, causing irregular resistance readings. WAIT 5 minutes. REPEAT the pinpoint test. **AB10 CHECK THE I-CAN (+) AND I-CAN (-) CIRCUITS FOR A SHORT TOGETHER WITH THE MODULES DISCONNECTED**

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-1	VDB13 (BU/GY)	C251-8	VDB14 (VT/GY)



- Disconnect the following modules one at a time until resistance is greater than 3 ohms.
  - APIM C3342 (4.2-inch screen) C2383 (8-inch touchscreen)
  - ACM C240A
  - Audio DSP module C4326A (Sony®) (if equipped)
  - FCIM C2402 (if equipped)
  - FCDIM C2123 (if equipped)
  - IPC C220
- **Did the resistance change to greater than 5 ohms with one of the modules disconnected?**

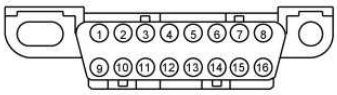
Yes
For the APIM , GO to AB18 . For the ACM , GO to AB19 . For the audio DSP module, GO to AB20 . For the FCIM , GO to AB21 . For the FCDIM , GO to AB22 . For the IPC , GO to AB23 .

No
REPAIR the affected circuit. CONNECT all modules. **AB11 CHECK THE I-CAN (+) AND I-CAN (-) CIRCUITS FOR A SHORT TO GROUND WITH THE MODULES DISCONNECTED**

- Measure the **resistance** between:

Positive Lead	

		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-1	VDB13 (BU/GY)	-	Grod
C251-8	VDB14 (VT/GY)	-	Ground



- Disconnect the following modules one at a time until the resistance is greater than 1,000 ohms.
  - APIM C3342 (4.2-inch screen) C2383 (8-inch touchscreen)
  - ACM C240A
  - Audio DSP module C4326A (Sony®) (if equipped)
  - FCIM C2402 (if equipped)
  - FCDIM C2123 (if equipped)
  - IPC C220
- **Are the resistances greater than 1,000 ohms?**

Yes
For the APIM , GO to AB18 . For the ACM , GO to AB19 . For the audio DSP module, GO to AB20 . For the FCIM , GO to AB21 . For the FCDIM , GO to AB22 . For the IPC , GO to AB23 .

No
REPAIR the affected circuit. CONNECT all modules. **AB12 CHECK FOR RESTORED COMMUNICATION WITH THE ACM AND FCIM DISABLED**

NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results.

- Disconnect: BCM Fuse 79 (7.5A).
- Using a scan tool, perform the network test.
- **Do all other I-CAN modules pass the network test?**

Yes
INSTALL the removed fuse.

If equipped with a FCIM , GO to AB13 .

If not equipped with a FCIM , GO to Pinpoint Test L .

No
GO to AB14 . **AB13 CHECK FOR RESTORED COMMUNICATION WITH THE FCIM DISCONNECTED**

NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results.

- Disconnect: FCIM C2402.
- Using a scan tool, perform the network test.
- **Do all other I-CAN modules pass the network test?**

Yes
CONNECT the module.

For restored operation with the FCIM disconnected, GO to Pinpoint Test M .

No
CONNECT the module. GO to AB14 . **AB14 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE AUDIO DSP MODULE DISABLED**

NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results.

- Disconnect: RJB Fuse 23 (25A).
- Using a scan tool, perform the network test.
- **Do all other modules pass the network test?**

Yes
INSTALL the removed fuse. GO to Pinpoint Test S .

No
INSTALL the removed fuse. GO to AB15 . **AB15 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE IPC DISABLED**

NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results.

- Disconnect: BCM Fuse 69 (5A).
- INSTALL the removed fuse.
- **Do all other modules pass the network test?**

Yes
INSTALL the removed fuse. GO to Pinpoint Test D .

No
INSTALL the removed fuse. GO to AB16 . **AB16 CHECK FOR RESTORED COMMUNICATION WITH THE APIM AND THE FCDIM DISABLED**

NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results.

- Disconnect: BCM Fuse 67 (7.5A).
- Using a scan tool, perform the network test.
- **Do all other I-CAN modules pass the network test?**

Yes
CONNECT all modules.

For restored operation with the APIM disabled, GO to AB17 .

If not equipped with an APIM , GO to Pinpoint Test N .

No
CONNECT all modules. The I-CAN tests within specification. VERIFY the correct operation of the scan tool on a known good vehicle. **AB17 CHECK FOR RESTORED COMMUNICATION WITH THE APIM DISCONNECTED**

> **NOTE:** When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results.

- Disconnect: APIM C3342 (4.2-inch screen) C2383 (8-inch touchscreen).
- Using a scan tool, perform the network test.
- **Do all other I-CAN modules pass the network test?**

Yes
CONNECT the module.

For restored operation with the APIM disconnected, GO to Pinpoint Test K .

No
CONNECT the module. The I-CAN tests within specification. VERIFY the correct operation of the scan tool on a known good vehicle. **AB18 CHECK THE APIM FOR CORRECT OPERATION**

- Disconnect the APIM connector.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)
  - damaged or bent pins - replace terminals/pins
  - pushed-out pins - replace pins as necessary
- Connect the APIM connector. Make sure it seats and latches correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new APIM . Refer to the appropriate section in Group 415 for the procedure.

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. **AB19 CHECK THE ACM FOR CORRECT OPERATION**

- Disconnect all the ACM connectors.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)
  - damaged or bent pins - replace terminals/pins
  - pushed-out pins - replace pins as necessary
- Reconnect all the ACM connectors. Make sure they are seated correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

Yes

CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new ACM . Refer to the appropriate section in Group 415 for the procedure.

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. **AB20 CHECK THE AUDIO DSP MODULE FOR CORRECT OPERATION**

- Disconnect all the audio DSP module connectors.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)
  - damaged or bent pins - replace terminals/pins
  - pushed-out pins - replace pins as necessary
- Reconnect all the audio DSP module connectors. Make sure they are seated correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new audio DSP module. Refer to the appropriate section in Group 415 for the procedure.

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. **AB21 CHECK THE FCIM FOR CORRECT OPERATION**

- Disconnect the FCIM connector.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)
  - damaged or bent pins - replace terminals/pins
  - pushed-out pins - replace pins as necessary
- Connect the FCIM connector. Make sure it seats and latches correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new FCIM . Refer to the appropriate section in Group 415 for the procedure.

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. **AB22 CHECK THE FCDIM FOR CORRECT OPERATION**

- Disconnect the FCDIM connector.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)
  - damaged or bent pins - replace terminals/pins
  - pushed-out pins - replace pins as necessary
- Connect the FCDIM connector. Make sure it seats and latches correctly.
- Operate the system and verify the concern is still present.

- **Is the concern still present?**

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new FCDIM . REFER to Section 415-00A or Section 415-00B .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. **AB23 CHECK THE IPC FOR CORRECT OPERATION**

- Disconnect the IPC connector.
- Repair:
  - corrosion (replace connector or terminals - clean module pins)
  - damaged or bent pins - replace terminals/pins
  - pushed-out pins - replace pins as necessary
- Connect the IPC connector. Make sure it seats and latches correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new IPC . REFER to Section 413-01 .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test AC: No Power To The Scan Tool

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The scan tool is connected to the Data Link Connector (DLC) to communicate with modules on the High Speed Controller Area Network (HS-CAN),Medium Speed Controller Area Network (MS-CAN) and Infotainment Controller Area Network (I-CAN).

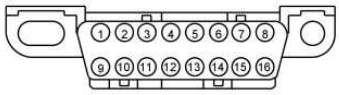
Possible Sources

- Fuse
- Wiring, terminals or connectors
- Data Link Connector (DLC)
- Scan tool

A loss of ground or poor ground at the DLC may result in HS-CAN , MS-CAN or I-CAN faults while the scan tool is connected.

PINPOINT TEST AC: NO POWER TO THE DLC

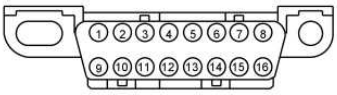
NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>AC1 CHECK DLC PINS FOR DAMAGE</td><td></td></tr>
<tr><td>• Disconnect the scan tool cable from the DLC .
• Inspect DLC pins 4, 5 and 16 for damage.
 

• Are DLC pins 4, 5 and 16 OK?</td><td>Yes
GO to AC2 .

No
REPAIR the DLC as necessary.</td></tr>
<tr><td>AC2 CHECK THE VOLTAGE SUPPLY CIRCUIT TO THE DLC</td><td></td></tr>
<tr><td>• Measure the voltage between:
<table><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr><tr><td>C251-16</td><td>SBP26 (YE/RD)</td><td>-</td><td>Ground</td></tr></table></td><td>Yes
GO to AC3 .

No
VERIFY the Body Control Module (BCM) fuse 73 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.</td></tr>
</table>

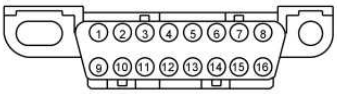


- **Is the voltage greater than 11 volts?**

AC3 CHECK THE DLC GROUND CIRCUITS FOR AN OPEN

- Disconnect: Negative Battery Cable.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C251-4	GD138 (BK/WH)	-	Ground
C251-5	GD133 (BK)	-	Ground



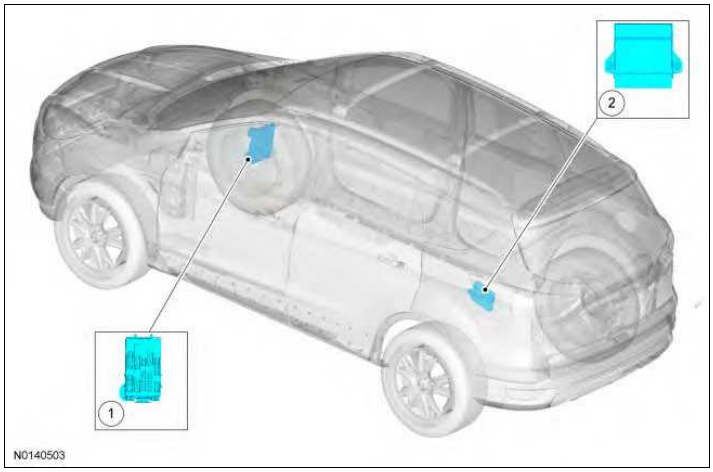
- **Are the resistances less than 3 ohms?**

Yes
CONNECT the negative battery cable. REPAIR the scan tool.

No
REPAIR the affected circuit. CONNECT the negative battery cable.

Module Controlled Functions

Component Location



Item	Description	Comments
1	Body Control Module (BCM)	-
2	Remote Function Actuator (RFA) module	-

Overview

The BCM controls:

- Battery saver function
- Brake shift interlock
- Delayed accessory function
- Dimmable backlighting
- Exterior lighting
- Ignition state messaging
- Interior lighting
- Key validation (part of PATS)
- Liftgate release
- PATS (without IA)
- Perimeter alarm
- Power door locks (without door module)
- Post crash alert function
- RKE system (without IA)
- Tire Pressure Monitoring System (TPMS)
- Transport mode

The RFA module (with IA) controls:

- IA function
- Key validation (part of PATS)

- PATS
- RKE signals (output controlled by the BCM)

System Operation

Battery Saver

NOTE: Time-out is 10 seconds if the vehicle is in factory mode or 0 seconds if the vehicle is in transport mode.

The BCM provides automatic shut-off of the courtesy and demand lamps after a time-out period when the ignition is OFF. A timer in the BCM starts when:

- the ignition transitions to OFF.
- any door or liftgate/luggage compartment lid becomes ajar.
- an unlock button of the RKE transmitter is pressed.
- a door is unlocked using a key.
- the door lock switch is pressed.

When 10 minutes (30 minutes for demand lamps) have elapsed, the BCM automatically shuts off voltage to the lamps. The timer restarts (voltage is restored if the BCM is in battery saver mode) if:

- the ignition transitions out of OFF.
- any door or liftgate/luggage compartment lid becomes ajar.
- the unlock button of the RKE transmitter is pressed.
- a door is unlocked using a key.
- the door lock switch is pressed.

Post Crash Alert Function

The post crash alert is a function controlled by the BCM . If the Restraints Control Module (RCM) determines an impact of enough severity (the air bags may or may not be deployed), the post crash alert function activates.

The post crash alert function:

- sounds the horn.
- turns on the interior lights.
- unlocks the doors.
- turns off the wipers, if on.

The post crash alert function can be turned off by:

- pressing the hazard flasher lamp switch (which may need to be pressed twice).
- pressing the RKE transmitter unlock button.
- pressing the RKE transmitter panic button.

FET Protection

A FET is a type of transistor that, when used with module software, monitors and controls current flow on module outputs. The FET protection strategy prevents module damage in the event of excessive current flow.

The BCM utilizes a FET protective circuit strategy for many of its outputs (for example, a headlamp output

circuit). Output loads (current level) are monitored for excessive current (typically short circuits) and are shut down (turns off the voltage or ground provided by the module) when a fault event is detected. A short circuit DTC is stored at the fault event and a cumulative counter is started.

When the demand for the output is no longer present, the module resets the FET circuit protection to allow the circuit to function. The next time the driver requests a circuit to activate that has been shut down by a previous short (FET protection) and the circuit is still shorted, the FET protection shuts off the circuit again and the cumulative counter advances.

When the excessive circuit load occurs often enough, the module shuts down the output until a repair procedure is carried out. Each FET protected circuit has 3 predefined levels of short circuit tolerance based on the harmful effect of each circuit fault on the FET and the ability of the FET to withstand it. A module lifetime level of fault events is established based upon the durability of the FET . If the total tolerance level is determined to be 600 fault events, the 3 predefined levels would be 200, 400 and 600 fault events.

When each tolerance level is reached, DTC U1000:00 should set along with the short circuit DTC that was stored on the first failure. These DTCs cannot be cleared until the vehicle is repaired.

After the repair, it is necessary to clear the DTCs using the Clear DTC operation on the scan tool, cycling the ignition, and run the BCM on-demand self-test.

The module never resets the fault event counter to zero and continues to advance the fault event counter as short circuit fault events occur. If the number of short circuit fault events reach the third level, DTC U3000:49 sets along with the associated short circuit DTC. DTC U3000:49 cannot be cleared and the module must be replaced after the initial fault is repaired.

Gateway Function

The BCM acts as a gateway module by receiving information in one format and transmitting it to other modules using another format. For example, the BCM receives the vehicle speed data from the ABS module over the HS-CAN , converts the data into a MS-CAN message and sends (gateways) the message to other network modules, such as the IPC . This enables network communication between modules that do not communicate using the same network (HS-CAN or MS-CAN).

Transport Mode

During vehicle build, some modules (such as the IPC and the BCM) are set to factory mode. When the vehicle build is complete, the vehicle is set to transport mode.

Transport mode is used to reduce the drain on the battery during longer periods when the vehicle is not used. Various system functions can be altered or disabled when in the transport mode. While in transport mode, the IPC displays TRANSPORT MODE in the message center. Transport mode can be disabled and placed into normal operation mode. Refer to Disabling Transport Mode .

Component Description

Body Control Module (BCM)

The BCM is a multifunction module that requires PMI when replaced. Refer to Section 418-01 .

Remote Function Actuator (RFA) Module

The RFA module is a multifunction module that requires PMI when replaced. Refer to Section 418-01 .

Diagnostic Trouble Code (DTC) Chart

Each module has a comprehensive DTC chart listed in an appropriate section. Refer to the table below for the section reference of a specific module DTC chart.

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Master DTC Index

Module	Reference
ABS module	REFER to Section 206-09 .
APIM	Refer to the appropriate section in Group 415 for the procedure.
ACM	Refer to the appropriate section in Group 415 for the procedure.
Audio DSP module	Refer to the appropriate section in Group 415 for the procedure.
BCM	REFER to the Body Control Module (BCM) DTC Chart in this section.
C-CM	REFER to Section 419-03 .
DDM	REFER to Section 501-14B .
DSM	REFER to Section 501-10A .
DCSM	REFER to Section 501-10A .
FCIM	Refer to the appropriate section in Group 415 for the procedure.
GPSM	Refer to the appropriate section in Group 415 for the procedure.
HVAC module	For EMTC , REFER to Section 412-00A . For DATC , REFER to Section 412-00B .
IPM-B	REFER to Section 413-13B .
IPC	REFER to Section 413-01 .
LTM	REFER to Section 501-03 .
OCSM	REFER to Section 501-20B .
PAM	REFER to Section 413-13A .
PDM	REFER to Section 501-14B .
PSCM	REFER to Section 211-02 .
PCM	REFER to Section 303-14 .
RFA module	REFER to the RFA Module DTC Chart in this section.
RCM	REFER to Section 501-20B .
SOD-L	REFER to Section 419-04 .
SOD-R	REFER to Section 419-04 .
SASM	REFER to Section 206-09 .
TPM module	REFER to Section 204-04B .

Body Control Module (BCM)

DTC Charts

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

BCM DTC Chart

DTC	Description	Action
B1008:23	Wiper Mode Switch: Signal Stuck Low	REFER to Section 501-16 .
B1013:11	Heater Rear Defog Switch: Circuit Short To Ground	For vehicle without window one-touch up, REFER to Section 501-11A . For vehicle with window one-touch up, REFER to Section 501-11B .
B1013:23	Heater Rear Defog Switch: Signal Stuck Low	For vehicle without window one-touch up, REFER To Section 501-11A . For vehicle with window one-touch up, REFER To Section 501-11B .
B102F:2F	Auxiliary Switch: Signal Erratic	REFER to Section 211-05 .
B1048:13	Brake Fluid Level Switch: Circuit Open	REFER to Section 413-01 .
B1051:92	Front Washer Switch: Performance Or Incorrect Operation	REFER to Section 501-16 .
B1052:92	Rear Washer Switch: Performance Or Incorrect Operation	REFER to Section 501-16 .
B1087:86	LIN Bus "A": Signal Invalid	If the low beams and the windshield wipers are both on, REFER to Section 417-01 . If only the low beams are on, REFER to Section 417-01 . If only the windshield wipers are on, REFER to Section 501-16 .
B1087:88	LIN Bus "A": Bus Off	If the low beams and the windshield wipers are both on, REFER to Section 417-01 . If only the low beams are on, REFER to Section 417-01 . If only the windshield wipers are on, REFER to Section 501-16 .
B1088:86	LIN Bus "B": Signal Invalid	REFER to Section 417-02 .
B1088:88	LIN Bus "B": Bus Off	REFER to Section 417-02 .
B108A:24	Start Button: Signal Stuck High	REFER to Section 211-05 .
B108B:23	Start Button Circuit A: Signal Stuck Low	REFER to Section 211-05 .
B108B:24	Start Button Circuit A:	REFER to Section 211-05 .

	Signal Stuck High	
B108B:2F	Start Button Circuit A: Signal Erratic	REFER to Section 211-05 .
B108C:23	Start Button Circuit B: Signal Stuck Low	REFER to Section 211-05 .
B108C:24	Start Button Circuit B: Signal Stuck High	REFER to Section 211-05 .
B108C:2F	Start Button Circuit B: Signal Erratic	REFER to Section 211-05 .
B1098:11	Left Position Light: Circuit Short To Ground	REFER to Section 417-01 .
B1098:15	Left Position Light: Circuit Short To Battery Or Open	REFER to Section 417-01 .
B1099:11	Right Position Light: Circuit Short To Ground	REFER to Section 417-01 .
B1099:15	Right Position Light: Circuit Short To Battery Or Open	REFER to Section 417-01 .
B109B:11	License Plate Light: Circuit Short To Ground	REFER to Section 417-01 .
B109B:15	License Plate Light: Circuit Short To Battery Or Open	REFER to Section 417-01 .
B10AD:04	Rain Sensor: System Internal Failure	REFER to Section 501-16 .
B10A2:02	Crash Input: General Signal Failure	GO to Pinpoint Test R .
B10AD:06	Rain Sensor: Algorithm Based Failure	REFER to Section 501-16 .
B10AD:83	Rain Sensor: Value Of Signal Protection Calculation Incorrect	REFER to Section 501-16 .
B10AF:11	Blower Fan Relay: Circuit Short To Ground	For EMTC , REFER to Section 412-00A . For DATC , REFER to Section 412-00B .
B10AF:13	Blower Fan Relay: Circuit Open	For EMTC , REFER to Section 412-00A . For DATC , REFER to Section 412-00B .
B10AF:19	Blower Fan Relay: Circuit Current Above Threshold	For EMTC , REFER to Section 412-00A . For DATC , REFER to Section 412-00B .
B10C0:11	Fuel Pump Power Supply: Circuit Short To Ground	REFER to Section 4 of the PC/ED Manual to diagnose PCM DTC B10C0:11.
B10C0:15	Fuel Pump Power Supply: Circuit Short To Battery Or Open	REFER to Section 4 of the PC/ED Manual to diagnose PCM DTC B10C0:15.
B10D5:94	PATS Antenna: Unexpected Operation	For vehicles without IA , REFER to Section 419-01B . For vehicles with IA , REFER to Section 419-01C .
B10D7:05	PATS Key: System Programming Failure	REFER to Section 419-01B .
B10D7:51	PATS Key: Not Programmed	REFER to Section 419-01B .
B10D7:81	PATS Key: Invalid Serial Data Received	For vehicles without IA , REFER to Section 419-01B . For vehicles with IA , REFER to Section 419-01C .

B10D7:87	PATS Key: Missing Message	For vehicles without IA , REFER to Section 419-01B . For vehicles with IA , REFER to Section 419-01C .
B10D7:94	PATS Key: Unexpected Operation	REFER to Section 419-01B .
B10D8:00	PATS Key Less Than Minimum Programmed: No Sub Type Information	For vehicles without IA , REFER to Section 419-01B . For vehicles with IA , REFER to Section 419-01C .
B10DA:51	PATS Target Identifier: Not Programmed	For vehicles without IA , REFER to Section 419-01B . For vehicles with IA , REFER to Section 419-01C .
B10E5:11	PCM Wake-Up Signal: Circuit Short To Ground	REFER to Section 303-06 .
B10E5:15	PCM Wake-Up Signal: Circuit Short To Battery Or Open	REFER to Section 303-06 .
B10E7:12	Ignition On Relay: Circuit Short To Battery	REFER to Section 211-05 .
B10E7:14	Ignition On Relay: Circuit Short To Ground Or Open	REFER to Section 211-05 .
B10EA:12	Positive temperature coefficient heater Circuit Short To Battery	REFER to Section 412-02 .
B10EA:14	Positive temperature coefficient heater Circuit Short To Ground or Open	REFER to Section 412-02 .
B10F1:13	Key In Switch: Circuit Open	REFER to Section 413-01 .
B1108:77	Driver Door Central Locking Motor: Commanded Position Not Reachable	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B1109:77	Passenger Door Central Locking Motor: Commanded Position Not Reachable	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B110A:77	Rear Door Driver Side Central Locking Motor: Commanded Position Not Reachable	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B110B:77	Rear Door Passenger Side Central Locking Motor: Commanded Position Not Reachable	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B1115:11	High Mounted Stop Lamp Control: Circuit Short To Ground	REFER to Section 417-01 .
B1115:15	High Mounted Stop Lamp Control: Circuit Short To Battery Or Open	REFER to Section 417-01 .
B112A:12	Ignition On Relay B: Circuit Short To Battery	REFER to Section 211-05 .
B112B:07	Steering Wheel Module: Mechanical Failure	INSTALL a new multifunction switch. REFER to Section 211-05 . TEST the system for normal operation. If the concern still exists, INSTALL a new SASM . REFER to Section 206-09 .

B112B:83	Steering Wheel Module: Value Of Signal Protection Calculation Incorrect	INSTALL a new multifunction switch. REFER to Section 211-05 . TEST the system for normal operation. If the concern still exists, INSTALL a new SASM . REFER to Section 206-09 .
B112B:87	Steering Wheel Module: Missing Message	REFER to Section 501-16 .
B112D:11	Rear Window Defrost LED: Circuit Short To Ground	REFER to Section 501-11B .
B112D:15	Rear Window Defrost LED: Circuit Short To Battery Or Open	REFER to Section 501-11B .
B1130:07	Light Switch Module: Mechanical Failure	INSTALL a new headlamp switch. REFER to Section 417-01 .
B1130:83	Light Switch Module: Value of Signal Protection Calculation Incorrect	REFER to Section 417-01 .
B1130:87	Light Switch Module: Missing Message	REFER to Section 417-01 .
B1131:55	Wiper Motor Module: Not Configured	REFER to Section 501-16 .
B1131:87	Wiper Motor Module: Missing Message	REFER to Section 501-16 .
B1175:64	Drivers Door Ajar Switch: Signal Plausibility Failure	REFER to Section 417-02 .
B1182:00	Tire Pressure Monitoring System: No Sub Type Information	REFER to Section 204-04B .
B1182:55	Tire Pressure Monitoring System: Not Configured	REFER to Section 204-04B .
B11CC:51	Immobilizer Keyless Vehicle Secret key: Not Programmed	REFER to Section 419-01C .
B11DB:83	Battery Monitoring Module "A": Value Of Signal Protection Calculation Incorrect	REFER to Section 414-00 .
B11DB:96	Battery Monitoring Module "A": Component Internal Failure	CLEAR the DTCs. REPEAT the BCM self test. If DTCs B11DB:96 is retrieved, INSTALL new battery cables. REFER to Section 414-01 .
B11E9:13	Left Rear Door Ajar Switch: Circuit Open	REFER to Section 417-01 .
B11EA:13	Right Rear Door Ajar Switch: Circuit Open	REFER to Section 417-01 .
B1206:11	Crash Occurred: Circuit Short To Ground	GO to Pinpoint Test O .
B1206:15	Crash Occurred: Circuit Short To Battery Or Open	GO to Pinpoint Test P .
B121A:11	Keypad Illumination Output: Circuit Short To Ground	REFER to Section 501-14B .
B121A:15	Keypad Illumination Output: Circuit Short To Battery Or	REFER to Section 501-14B .

	Open	
B121B:23	Keypad Input Switch: Signal Stuck Low	REFER to Section 501-14B .
B123A:09	Left Front Turn Indicator: Component Failure	REFER to Section 417-01 .
B123A:11	Left Front Turn Indicator: Circuit Short To Ground	REFER to Section 417-01 .
B123A:15	Left Front Turn Indicator: Circuit Short To Battery Or Open	REFER to Section 417-01 .
B123B:09	Right Front Turn Indicator: Component Failure	REFER to Section 417-01 .
B123B:11	Right Front Turn Indicator: Circuit Short To Ground	REFER to Section 417-01 .
B123B:15	Right Front Turn Indicator: Circuit Short To Battery Or Open	REFER to Section 417-01 .
B1247:09	Left Rear Turn Indicator: Component Failure	REFER to Section 417-01 .
B1247:11	Left Rear Turn Indicator: Circuit Short To Ground	REFER to Section 417-01 .
B1247:15	Left Rear Turn Indicator: Circuit Short To Battery Or Open	REFER to Section 417-01 .
B1248:09	Right Rear Turn Indicator: Component Failure	REFER to Section 417-01 .
B1248:11	Right Rear Turn Indicator: Circuit Short To Ground	REFER to Section 417-01 .
B1248:15	Right Rear Turn Indicator: Circuit Short To Battery Or Open	REFER to Section 417-01 .
B1249:12	Start Button Illumination: Circuit Short To Battery	REFER to Section 413-00 .
B1249:14	Start Button Illumination: Circuit Short To Ground Or Open	REFER to Section 413-00 .
B124D:02	Tire Pressure Sensor: General Signal Failure	ACTIVATE the TPMS sensors. REFER to Section 204-04B . If DTC B124D:02 is retrieved again, REFER to Section 204-04B .
B124D:4A	Tire Pressure Sensor: Incorrect Component Installed	REFER to Section 204-04B .
B1251:00	Tire Pressure Sensor Low Battery: No Sub Type Information	REFER to Section 204-04B .
B1254:51	Right Rear (Outside On Dual Wheel) Tire Pressure Sensor And Transmitter Assembly: Not Programmed	REFER to Section 204-04B .
B1255:51	Left Rear (Outside On Dual	REFER to Section 204-04B .

	Wheel) Tire Pressure Sensor And Transmitter Assembly: Not Programmed	
B1287:11	Central Lock Switch Illumination: Circuit Short To Ground	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B1287:15	Central Lock Switch Illumination: Circuit Short To Battery Or Open	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B129A:86	LIN Bus "D": Signal Invalid	REFER to Section 501-16 .
B129A:88	LIN Bus "D": Bus Off	REFER to Section 501-16 .
B12D3:23	Driver Door Lock Status: Signal Stuck Low	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B12E8:11	Liftgate/Tailgate Control/Release Switch: Circuit Short To Ground	For vehicles with manual liftgate without one-touch up, REFER to Section 501-14A . For vehicles with manual liftgate with one-touch up, REFER to Section 501-14B . For vehicles with power liftgate, REFER to Section 501-03 .
B12E8:23	Liftgate/Tailgate Control/Release Switch: Signal Stuck Low	For vehicles with manual liftgate without one-touch up, REFER to Section 501-14A . For vehicles with manual liftgate with one-touch up, REFER to Section 501-14B . For vehicles with power liftgate, REFER to Section 501-03 .
B12EA:56	Radio Frequency (RF) Receiver: Invalid / Incompatible Configuration	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B1305:13	Hood Switch: Circuit Open	REFER to Section 419-01A .
B1306:13	Liftgate Ajar Switch: Circuit Open	REFER to Section 413-01 .
B1318:13	Right Front Door Ajar Switch: Circuit Open	REFER to Section 417-02 .
B1319:11	Shift Interlock (BSI) Output Circuit: Circuit Short To Ground	REFER to Section 307-05 .
B1319:15	Shift Interlock (BSI) Output Circuit: Circuit Short To Battery Or Open	REFER to Section 307-05 .
B131A:12	Delayed Accessory Power: Circuit Short To Battery	For vehicles without window one-touch up, REFER to Section 501-11A . For vehicles with window one-touch up, REFER to Section 501-11B .
B131B:13	Left Front Door Ajar Switch: Circuit Open	REFER to Section 417-02 .
B1323:11	Horn Switch: Circuit Short To Ground	REFER to Section 413-06 .
B1323:23	Horn Switch: Signal Stuck Low	REFER to Section 413-06 .
B1390:83	Ambient Light Control Module: Value Of Signal Protection Calculation Incorrect	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section 418-01 . If there have been no recent service actions, INSTALL a new module to correct the failure to retain configuration data.

B1390:87	Ambient Light Control Module: Missing Message	REFER to Section 417-02 .
B1399:05	Personalized Key Synchronization: System Programming Failure	REFER to Section 419-01C .
B13B0:13	Passenger Side Front Door Unlock Switch: Circuit Open	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B13B1:13	Left Side Rear Door Unlock Switch: Circuit Open	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B13B2:13	Right Side Rear Door Unlock Switch: Circuit Open	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B1A84:41	Car Configuration Data: General Checksum Failure	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section 418-01 . If there have been no recent service actions, INSTALL a new BCM to correct the failure to retain configuration data. REFER to Body Control Module (BCM) .
B1A84:51	Car Configuration Data: Not Programmed	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section 418-01 . If there have been no recent service actions, INSTALL a new BCM to correct the failure to retain configuration data. REFER to Body Control Module (BCM) .
B1A85:21	Ambient Light Sensor: Signal Amplitude	REFER to Section 417-01 .
B1A85:22	Ambient Light Sensor: Signal Amplitude > Maximum	REFER to Section 417-01 .
B1A85:2F	Ambient Light Sensor: Signal Erratic	REFER to Section 417-01 .
B1B71:21	Evaporator Temperature Sensor: Signal Amplitude	For EMTC , REFER to Section 412-00A . For DATC , REFER to Section 412-00B .
B1B71:22	Evaporator Temperature Sensor: Signal Amplitude > Maximum	For EMTC , REFER to Section 412-00A . For DATC , REFER to Section 412-00B .
B1B71:2F	Evaporator Temperature Sensor: Signal Erratic	For EMTC , REFER to Section 412-00A . For DATC , REFER to Section 412-00B .
B1C37:11	Master Lock Switch: Circuit Short To Ground	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B1C37:23	Master Lock Switch: Signal Stuck Low	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B1C38:11	Master Unlock Switch: Circuit Short To Ground	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B1C38:23	Master Unlock Switch: Signal Stuck Low	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B1C55:11	Horn Relay: Circuit Short To Ground	REFER to Section 413-06 .
B1C55:13	Horn Relay: Circuit Open	REFER to Section 413-06 .

B1C55:19	Horn Relay: Circuit Current Above Threshold	REFER to Section 413-06 .
B1C77:11	Rear Wiper Relay: Circuit Short To Ground	REFER to Section 501-16 .
B1C77:13	Rear Wiper Relay: Circuit Open	REFER to Section 501-16 .
B1C77:19	Rear Wiper Relay: Circuit Current Above Threshold	REFER to Section 501-16 .
B1C84:11	Heated Rear Window Relay Output: Circuit Short To Ground	REFER to Section 501-11B .
B1C84:12	Heated Rear Window Relay Output: Circuit Short To Battery	REFER to Section 501-11B .
B1C84:13	Heated Rear Window Relay Output: Circuit Open	REFER to Section 501-11B .
B1D00:11	Left Low Beam: Circuit Short To Ground	REFER to Section 417-01 .
B1D00:15	Left Low Beam: Circuit Short To Battery Or Open	REFER to Section 417-01 .
B1D01:11	Right Low Beam: Circuit Short To Ground	REFER to Section 417-01 .
B1D01:15	Right Low Beam: Circuit Short To Battery Or Open	REFER to Section 417-01 .
B1D13:11	Interior Lights Circuit "A": Circuit Short To Ground	REFER to Section 417-02 .
B1D13:12	Interior Lights Circuit "A": Circuit Short To Battery	REFER to Section 417-02 .
B1D21:62	Remote Control Switch: Signal Compare Failure	For vehicles without one-touch up, REFER to Section 501-14A . For vehicles with one-touch up, REFER to Section 501-14B .
B1D35:11	Hazard Switch: Circuit Short To Ground	REFER to Section 417-01 .
B1D35:23	Hazard Switch: Signal Stuck Low	REFER to Section 417-01 .
B1D38:16	Front Wiper Motor: Circuit Voltage Below Threshold	REFER to Section 501-16 .
B1D38:17	Front Wiper Motor: Circuit Voltage Above Threshold	REFER to Section 501-16 .
B1D38:19	Front Wiper Motor: Circuit Current Above Threshold	REFER to Section 501-16 .
B1D38:96	Front Wiper Motor: Component Internal Failure	REFER to Section 501-16 .
C111A:11	Right Stop Lamp: Circuit Short To Ground	REFER to Section 417-01 .
C111A:15	Right Stop Lamp: Circuit Short To Battery Or Open	REFER to Section 417-01 .
C111B:11	Left Stop Lamp: Circuit Short To Ground	REFER to Section 417-01 .
C111B:15		REFER to Section 417-01 .

	Left Stop Lamp: Circuit Short To Battery Or Open	
C1A56:51	Left Front Tire Pressure Sensor and Transmitter Assembly: Not Programmed	REFER to Section 204-04B .
C1A58:51	Right Front Tire Pressure Sensor and Transmitter Assembly: Not Programmed	REFER to Section 204-04B .
C1A96:24	Brake Light: Signal Stuck High	REFER to Section 417-01 .
C1D00:23	Park Brake Apply Switch: Signal Stuck Low	REFER to Section 413-01 .
P0460:21	Fuel Level Sensor A Circuit: Signal Amplitude	REFER to Section 413-01 .
P0460:22	Fuel Level Sensor A Circuit: Signal Amplitude > Maximum	REFER to Section 413-01 .
P0460:2F	Fuel Level Sensor A Circuit: Signal Erratic	REFER to Section 413-01 .
P0604:00	Internal Control Module Random Access Memory (RAM) Error: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section 418-01 . If there have been no recent service actions, INSTALL a new BCM to correct the failure to retain configuration data. REFER to Body Control Module (BCM) .
P0605:00	Internal Control Module Read Only Memory (ROM) Error: No Sub Type Information	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
P062F:00	Internal Control Module EEPROM Error: No Sub Type Information	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
P1594:04	Forced Engine Shutdown - Remote Start System Fault, No Unattended Vehicle Timeout: System Internal Failure	PERFORM a PMI procedure. REFER to Section 418-01 . CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
P1674:00	Control Module Software Corrupted: No Sub Type Information	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
P1934:87	Vehicle Speed Signal: Missing Message	REFER to Section 413-01 , Speedometer Inoperative.
U0001:88	High Speed CAN Communication Bus: Bus Off	The module could not communicate on the network at a point in time. The fault is not currently present (the module had to communicate with the scan tool to report this DTC). VERIFY the integrity of the connectors and wiring. Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.
U0004:00	High Speed CAN Communication Bus (+)	REFER to Section 418-00 .

	Low: No Sub Type Information	
U0005:00	High Speed CAN Communication Bus (+) High: No Sub Type Information	REFER to Section 418-00 .
U0007:00	High Speed CAN Communication Bus (-) Low: No Sub Type Information	REFER to Section 418-00 .
U0008:00	High Speed CAN Communication Bus (-) High: No Sub Type Information	REFER to Section 418-00 .
U0009:00	High Speed CAN Communication Bus (-) Shorted To Bus (+): No Sub Type Information	REFER to Section 418-00 .
U0010:88	Medium Speed CAN Communication Bus: Bus Off	The module could not communicate on the network at a point in time. The fault is not currently present (the module had to communicate with the scan tool to report this DTC). VERIFY the integrity of the connectors and wiring. Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information.
U0013:00	Medium Speed CAN Communication Bus (+) Low: No Sub Type Information	REFER to Section 418-00 .
U0014:00	Medium Speed CAN Communication Bus (+) High: No Sub Type Information	REFER to Section 418-00 .
U0016:00	Medium Speed CAN Communication Bus (-) Low: No Sub Type Information	REFER to Section 418-00 .
U0017:00	Medium Speed CAN Communication Bus (-) High: No Sub Type Information	REFER to Section 418-00 .
U0018:00	Medium Speed CAN Communication Bus (-) Shorted To Bus (+): No Sub Type Information	REFER to Section 418-00 .
U0037:88	Vehicle Communication Bus B: Bus off	REFER to Section 419-04 .
U0040:00	Vehicle Communication Bus "B" (+) Low: No Sub Type Information	REFER to Section 419-04 .
U0041:00	Vehicle Communication Bus "B" (+) High: No Sub Type	REFER to Section 419-04 .

	Information	
U0043:00	Vehicle Communication Bus "B" (-) Low: No Sub Type Information	REFER to Section 419-04 .
U0044:00	Vehicle Communication Bus "B" (-) High: No Sub Type Information	REFER to Section 419-04 .
U0045:00	Vehicle Communication Bus "B" (-) shorted to Bus "B" (+) No Sub Type Information	REFER to Section 419-04 .
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	GO to Pinpoint Test A .
U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	GO to Pinpoint Test B .
U0122:00	Lost Communication With Vehicle Dynamics Control Module: No Sub Type Information	FOLLOW the diagnostics for DTC U0121:00. REFER to GO to Pinpoint Test B .
U0131:00	Lost Communication With Power Steering Control Module: No Sub Type Information	GO to Pinpoint Test C .
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	GO to Pinpoint Test D .
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test E .
U0164:00	Lost Communication With HVAC Control Module: No Sub Type Information	GO to Pinpoint Test F .
U0199:00	Lost Communication With "Door Control Module A": No Sub Type Information	GO to Pinpoint Test G .
U0200:00	Lost Communication With "Door Control Module B": No Sub Type Information	GO to Pinpoint Test H .
U0214:00	Lost Communication With Remote Function Actuation: No Sub Type Information	GO to Pinpoint Test I .
U0230:00	Lost Communication With Rear Gate Module: No Sub Type Information	GO to Pinpoint Test Q .
U0231:00	Lost Communication With Rain Sensing Module: No Sub Type Information	REFER to Section 501-16 .

U0515:00	Invalid Data Received From Remote Function Actuation: No Sub Type Information	RETRIEVE and REPAIR all non-network DTCs set in the RFA module. REFER to the RFA Module DTC Chart in this section.
U1000:00	Solid State Driver Protection Active - Driver Disabled: No Sub Type Information	GO to Pinpoint Test J .
U1007:00	Lost Communication With Battery Monitoring Sensor "A": No Sub Type Information	REFER to Section 414-00 .
U1A01:00	Communication Link: No Sub Type Information	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
U2010:11	Switch Illumination: Circuit Short To Ground	REFER to Section 413-00 .
U2010:15	Switch Illumination: Circuit Short To Battery Or Open	REFER to Section 413-00 .
U2017:41	Control Module Software #2: General Checksum Failure	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
U2017:51	Control Module Software #2: Not Programmed	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
U2018:41	Control Module Software #3: General Checksum Failure	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
U2018:51	Control Module Software #3: Not Programmed	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
U2100:00	Initial Configuration Not Complete: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section 418-01 . If there have been no recent service actions, INSTALL a new BCM to correct the failure to retain configuration data. REFER to Body Control Module (BCM) .
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section 418-01 . If there have been no recent service actions, INSTALL a new BCM to correct the failure to retain configuration data. REFER to Body Control Module (BCM) .
U2200:00	Control Module Configuration Memory Corrupt No Sub Type Information	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
U2300:56	Central Configuration: Invalid / Incompatible Configuration	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section

		418-01 . If there have been no recent service actions, INSTALL a new BCM to correct the failure to retain configuration data. REFER to Body Control Module (BCM) .
U3000:49	Control Module: Internal Electronic Failure	DIAGNOSE all other DTCs first. After the repair, INSTALL a new BCM . REFER to Body Control Module (BCM) .
U3000:92	Control Module: Performance Or Incorrect Operation	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
U3000:96	Control Module: Component Internal Failure	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new BCM . REFER to Body Control Module (BCM) .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test M .
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test N .
U3006:13	Control Module Input Power "A": Circuit Open	GO to Pinpoint Test K .
U3008:13	Control Module Ground "A": Circuit Open	GO to Pinpoint Test L .
U300A:13	Ignition Switch: Circuit Open	REFER to Section 211-05 .

Symptom Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Symptom Chart

Pinpoint Tests

Pinpoint Test A: DTC U0100:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:00		

	Lost Communication With ECM/PCM "A": No Sub Type Information	Sets in the BCM if data messages received from the PCM over the HS-CAN are missing.

Possible Sources

- BCM
- PCM

PINPOINT TEST A: DTC U0100:00

Test Step	Result / Action to Take
A1 VERIFY THE SCAN TOOL COMMUNICATES WITH THE PCM	
• Connect the scan tool. • Check that a vehicle session can be established using the scan tool. • **Can a vehicle session be established?**	**Yes** GO to A2 . **No** REFER to Section 418-00 , The PCM Does Not Respond To The Scan Tool.
A2 CHECK THE BCM CONTINUOUS MEMORY DTCs	
• Ignition ON. • Using a scan tool, perform the BCM self-test. • Clear the DTCs. • Ignition OFF. • Ignition ON. • Wait 10 seconds. • Repeat the BCM self-test. • **Is DTC U0100:00 retrieved again?**	**Yes** GO to A3 . **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
A3 RETRIEVE THE RECORDED DTCs FROM THE PCM KOEO SELF-TEST	
• Using a scan tool, perform the PCM KOEO self-test. • **Is DTC P0562 or DTC P0563 recorded?**	**Yes** REFER to Section 303-14 . **No** GO to A4 .
A4 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	
• Using a scan tool, perform the BCM self-test. • **Are any DTCs recorded?**	**Yes** REFER to BCM DTC Chart in this section. **No** GO to A5 .
A5 CHECK FOR DTC U0100:00 SET IN OTHER MODULES	
• Ignition ON.	**Yes** GO to A6 .

• Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC U0100:00 set in the ABS module and in the RCM ?**	**No** GO to A7 .
A6 CHECK FOR CORRECT PCM OPERATION	
• Disconnect and inspect all PCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the PCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new PCM. REFER to Section 303-14 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
A7 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test B: DTC U0121:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	Sets in the BCM if data messages received from the ABS module over the HS-CAN are missing for 5 seconds or more.

Possible Sources

- ABS module
- BCM

PINPOINT TEST B: DTC U0121:00

Test Step	Result / Action to Take
B1 VERIFY THE CUSTOMER CONCERN	
• Ignition ON. • Verify there is an observable symptom present. • **Is an observable symptom present?**	**Yes** GO to B2 . **No** The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
B2 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Using a scan tool, perform a network test. • **Does the ABS module pass the network test?**	**Yes** GO to B3 . **No** REFER to Section 418-00 , The ABS Module Does Not Respond To The Scan Tool.
B3 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	
• Using a scan tool, perform the BCM self-test. • **Is DTC U3003:16 or DTC U3003:17 recorded?**	**Yes** For DTC U3003:16, GO to Pinpoint Test M . For DTC U3003:17, GO to Pinpoint Test N . **No** GO to B4 .
B4 RETRIEVE THE RECORDED DTCs FROM THE ABS MODULE SELF-TEST	
• Using a scan tool, perform the ABS module self-test.	**Yes** REFER to Section 206-09 .

• **Is DTC U3003:16 or DTC U3003:17 recorded?**	**No** GO to B5 .
B5 RECHECK THE BCM DTCs	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out. • Clear the DTCs. • Ignition OFF. • Ignition ON. • Wait 10 seconds. • Using a scan tool, perform the BCM self-test. • **Is DTC U0121:00 still present?**	**Yes** GO to B6 . **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
B6 CHECK FOR DTC U0121:00 SET IN OTHER MODULES	
• Clear all DTCs. • Ignition OFF. • Ignition ON. • Wait 10 seconds. • Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC U0121:00 set in the PSCM ?**	**Yes** GO to B7 . **No** GO to B8 .
B7 CHECK FOR CORRECT ABS MODULE OPERATION	
• Disconnect and inspect the ABS module connector. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the ABS module connector. Make sure it seats and latches correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new HCU . REFER to Section 206-09 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
B8 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) . **No**

• Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test C: DTC U0131:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0131:00	Lost Communication With Power Steering Control Module: No Sub Type Information	Sets in the BCM if data messages received from the PSCM over the HS-CAN are missing for 5 seconds or more.

Possible Sources

- BCM
- PSCM

PINPOINT TEST C: DTC U0131:00

Test Step	Result / Action to Take
C1 VERIFY THE CUSTOMER CONCERN	
• Ignition ON. • Verify there is an observable symptom present. • **Is an observable symptom present?**	**Yes** GO to C2 . **No** The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
C2 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Using a scan tool, perform a network test. • **Does the PSCM module pass the network test?**	**Yes** GO to C3 . **No** REFER to Section 418-00 , The PSCM Does Not Respond To The Scan Tool.

C3 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	
• Using a scan tool, perform the BCM self-test. • **Is DTC U3003:16 or DTC U3003:17 recorded?**	**Yes** For DTC U3003:16, GO to Pinpoint Test M . For DTC U3003:17, GO to Pinpoint Test N . **No** GO to C4 .
C4 RETRIEVE THE RECORDED DTCs FROM THE PSCM SELF-TEST	
• Using a scan tool, perform the PSCM self-test. • **Is DTC U3003:16 or U3003:17 recorded?**	**Yes** REFER to Section 211-02 . **No** GO to C5 .
C5 RECHECK THE BCM DTCs	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out. • Clear the DTCs. • Ignition OFF. • Ignition ON. • Wait 10 seconds. • Using a scan tool, perform the BCM self-test. • **Is DTC U0131:00 still present?**	**Yes** GO to C6 . **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
C6 CHECK FOR DTC U0131:00 SET IN OTHER MODULES	
• Clear all DTCs. • Ignition OFF. • Ignition ON. • Wait 10 seconds. • Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC U0131:00 set in the ABS module?**	**Yes** INSTALL a new steering gear. REFER to Section 211-02 . CLEAR the DTC. CYCLE the ignition OFF and ON. WAIT 10 seconds. REPEAT the BCM self-test. If DTC U0131:00 is still present GO to C7 . **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
C7 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) .

♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test D: DTC U0151:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	Sets in the BCM if SRS messages received from the RCM over the HS-CAN are missing.

Possible Sources

- BCM
- RCM

PINPOINT TEST D: DTC U0151:00

Test Step	Result / Action to Take
D1 VERIFY THE CUSTOMER CONCERN	
• Ignition ON. • Verify there is an observable symptom present. • **Is an observable symptom present?**	**Yes** GO to D2 . **No** The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
D2 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Using a scan tool, perform a network test. • **Does the RCM pass the network test?**	**Yes** GO to D3 . **No** REFER to Section 418-00 , The RCM Does Not Respond To The Scan Tool.

D3 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	
• Using a scan tool, perform the BCM self-test. • **Is DTC U3003:16 or DTC U3003:17 recorded?**	**Yes** For DTC U3003:16, GO to Pinpoint Test M . For DTC U3003:17, GO to Pinpoint Test N . **No** GO to D4 .
D4 RETRIEVE THE RECORDED DTCs FROM THE RCM SELF-TEST	
• Using a scan tool, perform the RCM self-test. • **Is DTC U3003:16 or DTC U3003:17 recorded?**	**Yes** REFER to Section 501-20B . **No** GO to D5 .
D5 RECHECK THE BCM DTCs	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out. • Clear the DTCs. • Ignition OFF. • Wait 10 seconds. • Ignition ON. • Using a scan tool, perform the BCM self-test. • **Is DTC U0151:00 still present?**	**Yes** GO to D6 . **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
D6 CHECK FOR DTC U0151:00 SET IN OTHER MODULES	
• Clear all DTCs. • Ignition OFF. • Wait 10 seconds. • Ignition ON. • Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC U0151:00 set in the OCSM and ABS module?**	**Yes** GO to D7 . **No** GO to D8 .
D7 CHECK FOR CORRECT RCM OPERATION	
• Disconnect and inspect all RCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the RCM connectors. Make sure they seat and latch correctly.	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new RCM . REFER to Section 501-20B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root

• Operate the system and determine if the concern is still present. • **Is the concern still present?**	cause of any connector or pin issues.
D8 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test E: DTC U0155:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	Sets in the BCM if driver information messages received from the IPC over the MS-CAN are missing.

Possible Sources

- BCM
- IPC

PINPOINT TEST E: DTC U0155:00

Test Step	Result / Action to Take
E1 VERIFY THE CUSTOMER CONCERN	
• Ignition ON. • Verify there is an observable symptom present.	**Yes** GO to E2 .

• **Is an observable symptom present?**	**No** The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
E2 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Using a scan tool, perform a network test. • **Does the IPC pass the network test?**	**Yes** GO to E3 . **No** REFER to Section 418-00 , The IPC Does Not Respond To The Scan Tool.
E3 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	
• Using a scan tool, perform the BCM self-test. • **Is DTC U3003:16 or DTC U3003:17 recorded?**	**Yes** For DTC U3003:16, GO to Pinpoint Test M . For DTC U3003:17, GO to Pinpoint Test N . **No** GO to E4 .
E4 RETRIEVE THE RECORDED DTCs FROM THE IPC SELF-TEST	
• Using a scan tool, perform the IPC self-test. • **Is DTC U3006:16 or DTC U3006:17 recorded?**	**Yes** REFER to Section 413-01 . **No** GO to E5 .
E5 RECHECK THE BCM DTCs	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out. • Clear the DTCs. • Ignition OFF. • Wait 10 seconds. • Ignition ON. • Using a scan tool, perform the BCM self-test. • **Is DTC U0155:00 still present?**	**Yes** GO to E6 . **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
E6 CHECK FOR DTC U0155:00 SET IN OTHER MODULES	
• Clear all DTCs. • Ignition OFF. • Wait 10 seconds. • Ignition ON. • Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC U0155:00 set in other MS-CAN modules?**	**Yes** GO to E7 . **No** GO to E8 .

E7 CHECK FOR CORRECT IPC OPERATION	
• Disconnect and inspect the IPC connector. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the IPC connector. Make sure it seats and latches correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new IPC . REFER to Section 413-01 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
E8 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test F: DTC U0164:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0164:00	Lost Communication With HVAC Control Module: No Sub Type Information	Sets in the BCM if climate control messages received from the HVAC module over the MS-CAN are missing.

Possible Sources

- BCM
- HVAC module

PINPOINT TEST F: DTC U0164:00

Test Step	Result / Action to Take
F1 VERIFY THE CUSTOMER CONCERN	
• Ignition ON. • Verify there is an observable symptom present. • **Is an observable symptom present?**	**Yes** GO to F2 . **No** The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
F2 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Using a scan tool, perform a network test. • **Does the HVAC module pass the network test?**	**Yes** GO to F3 . **No** REFER to Section 418-00 , The HVAC Module Does Not Respond To The Scan Tool.
F3 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	
• Using a scan tool, perform the BCM self-test. • **Is DTC U3006:16 or DTC U3006:17 recorded?**	**Yes** For DTC U3003:16, GO to Pinpoint Test M . For DTC U3003:17, GO to Pinpoint Test N . **No** GO to F4 .
F4 RETRIEVE THE RECORDED DTCs FROM THE HVAC MODULE SELF-TEST	
• Using a scan tool, perform the HVAC self-test. • **Is DTC U3006:16 or DTC U3006:17 recorded?**	**Yes** REFER to Section 412-00A (EMTC) or Section 412-00B (DATC). **No** GO to F5 .
F5 RECHECK THE BCM DTCs	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out. • Clear the DTCs. • Ignition OFF. • Wait 10 seconds.	**Yes** INSTALL a new HVAC module. REFER to Section 412-00A (EMTC) or Section 412-00B (DATC). CLEAR the DTC. REPEAT the BCM self-test. If DTC U0164:00 is still present, GO to F6 . **No** The system is operating correctly at this time.

• Ignition ON. • Using a scan tool, perform the BCM self-test. • **Is DTC U0164:00 still present?**	The DTC may have been set due to high network traffic or an intermittent fault condition.
F6 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test G: DTC U0199:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0199:00	Lost Communication With "Door Control Module A": No Sub Type Information	Sets in the BCM if power window and door lock messages received from the DDM over the MS-CAN are missing.

Possible Sources

- BCM
- DDM

PINPOINT TEST G: DTC U0199:00

Test Step	Result / Action to Take
G1 VERIFY THE CUSTOMER CONCERN	
• Ignition ON. • Verify there is an observable symptom present.	**Yes** GO to G2 .

• **Is an observable symptom present?**	**No** The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
G2 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Using a scan tool, perform a network test. • **Does the DDM pass the network test?**	**Yes** GO to G3 . **No** REFER to Section 418-00 , The DDM Does Not Respond To the Scan Tool.
G3 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	
• Using a scan tool, perform the BCM self-test. • **Is DTC U3003:16 or DTC U3003:17 recorded?**	**Yes** For DTC U3003:16, GO to Pinpoint Test M . For DTC U3003:17, GO to Pinpoint Test N . **No** GO to G4 .
G4 RETRIEVE THE RECORDED DTCs FROM THE DDM SELF-TEST	
• Using a scan tool, perform the DDM self-test. • **Is DTC U3003:62 recorded?**	**Yes** REFER to Section 501-14B . **No** GO to G5 .
G5 RECHECK THE BCM DTCs	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out. • Clear the DTCs. • Ignition OFF. • Wait 10 seconds. • Ignition ON. • Using a scan tool, perform the BCM self-test. • **Is DTC U0199:00 still present?**	**Yes** GO to G6 . **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
G6 CHECK FOR DTC U0199:00 SET IN OTHER MODULES	
• Clear all DTCs. • Ignition OFF. • Ignition ON. • Wait 10 seconds. • Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC U0199:00 set in the IPC module?**	**Yes** GO to G7 . **No** GO to G8 .
G7 CHECK FOR CORRECT DDM OPERATION	

• Disconnect and inspect all DDM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the DDM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new DDM . REFER to Section 501-14B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
G8 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test H: DTC U0200:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0200:00	Lost Communication With "Door Control Module B": No Sub Type Information	Sets in the BCM if power window and door lock messages received from the PDM over the MS-CAN are missing.

Possible Sources

- BCM
- PDM

PINPOINT TEST H: DTC U0200:00

Test Step	Result / Action to Take
H1 VERIFY THE CUSTOMER CONCERN	
• IgnitiN. • Verify there is an observable symptom present. • **Is an observable symptom present?**	**Yes** GO to H2 . **No** The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
H2 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Using a scan tool, perform a network test. • **Does the passenger door module pass the network test?**	**Yes** GO to H3 . **No** REFER to Section 418-00 , The PDM Does Not Respond To The Scan Tool.
H3 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	
• Using a scan tool, perform the BCM self-test. • **Is DTC U3003:16 or DTC U3003:17 recorded?**	**Yes** For DTC U3003:16, GO to Pinpoint Test M . For DTC U3003:17, GO to Pinpoint Test N . **No** GO to H4 .
H4 RETRIEVE THE RECORDED DTCs FROM THE PDM SELF-TEST	
• Using a scan tool, perform the PDM self-test. • **Is DTC U3003:62 recorded?**	**Yes** REFER to Section 501-14B . **No** GO to H5 .
H5 RECHECK THE BCM DTCs	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out. • Clear the DTCs. • Ignition OFF. • Wait 10 seconds. • Ignition ON. • Using a scan tool, perform the BCM self-test. • **Is DTC U0200:00 still present?**	**Yes** GO to H6 . **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
H6 CHECK FOR DTC U0200:00 SET IN OTHER MODULES	

• Clear all DTCs. • Ignition OFF. • Ignition ON. • Wait 10 seconds. • Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC U0200:00 set in other modules?**	**Yes** GO to H7 . **No** GO to H8 .
H7 CHECK FOR CORRECT PDM OPERATION	
• Disconnect and inspect all PDM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the PDM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new PDM . REFER to Section 501-14B . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
H8 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test I: DTC U0214:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0214:00	Lost Communication With Remote Function Actuation: No Sub Type Information	Sets in the a BCM if IA messages received from the RFA module over the MS-CAN are missing.

Possible Sources

- BCM
- RFA module

PINPOINT TEST I: DTC U0214:00

Test Step	Result / Action to Take
I1 VERIFY THE CUSTOMER CONCERN	
• Ignition ON. • Verify there is an observable symptom present. • **Is an observable symptom present?**	**Yes** GO to I2 . **No** The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
I2 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Using a scan tool, perform a network test. • **Does the RFA module pass the network test?**	**Yes** GO to I3 . **No** REFER to Section 418-00 , The RFA Module Does Not Respond To The Scan Tool.
I3 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	
• Using a scan tool, perform the BCM self-test. • **Is DTC U3003:16 or DTC U3003:17 recorded?**	**Yes** For DTC U3003:16, GO to Pinpoint Test M . For DTC U3003:17, GO to Pinpoint Test N . **No** GO to I4 .
I4 RETRIEVE THE RECORDED DTCs FROM THE RFA MODULE SELF-TEST	
• Using a scan tool, perform the RFA module self-test. • **Is DTC U3003:62 recorded?**	**Yes** GO to Pinpoint Test R . **No** GO to I5 .
I5 RECHECK THE BCM DTCs	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set	**Yes** GO to I6 . **No**

during the PMI or the PMI may not have been carried out. • Clear the DTCs. • Ignition OFF. • Wait 10 seconds. • Ignition ON. • Using a scan tool, perform the BCM self-test. • **Is DTC U0214:00 still present?**	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
I6 CHECK FOR DTC U0214:00 SET IN OTHER MODULES	
• Clear all DTCs. • Ignition OFF. • Ignition ON. • Wait 10 seconds. • Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC U0214:00 set in other modules?**	**Yes** GO to I7 . **No** GO to I8 .
I7 CHECK FOR CORRECT RFA MODULE OPERATION	
• Disconnect and inspect all RFA module connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the RFA module connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new RFA module. REFER to Remote Function Actuator (RFA) Module . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.
I8 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

• Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	

Pinpoint Test J: DTC U1000:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

The BCM controls the output of several vehicle systems by means of solid state drivers. When an overload occurs on any of these drivers, the BCM disables the output and tracks the number of repetitive faults on each of these circuits. The module compares this number of overloads to 3 progressive thresholds established for each circuit. At the threshold, DTC U1000:00 sets along with the DTC associated with the affected circuit.

Refer to System Operation - Field Effect Transistor (FET) Protection in Module Controlled Functions .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U1000:00	Solid State Driver Protection Activated - Driver Disabled: No Sub Type Information	Sets when the BCM has disabled a circuit due to a repetitive circuit overload and a progressive threshold is met.

Possible Sources

- BCM

PINPOINT TEST J: DTC U1000:00

Test Step	Result / Action to Take
J1 REVIEW THE DTCs	
• Review the DTCs from the BCM self-test. • **Are any other DTCs present besides U1000:00 or U3000:49?**	**Yes** DIAGNOSE the fault causing the DTCs other than U1000:00 and U3000:49. REFER to the BCM DTC Chart in this section. After the repair, GO to J2 . **No** GO to J2 .
J2 REPEAT THE BCM SELF-TEST	

• Ignition ON. • Using a scan tool, clear the DTCs. Repeat the BCM self-test and clear the DTCs. • **Is DTC U3000:49 present?**	**Yes** INSTALL a new BCM . REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The circuit short has been repaired.

Pinpoint Test K: DTC U3006:13

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 13 , Power Distribution/BCM for schematic and connector information.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3006:13	Control Module Input Power "A": Circuit Open	Sets in the BCM module if one of the voltage inputs is open.

Possible Sources

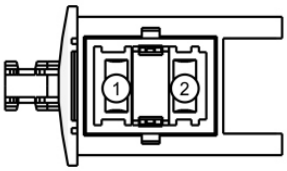
- Wiring, terminals or connectors
- BCM

PINPOINT TEST K: DTC U3006:13

Test Step	Result / Action to Take
K1 CHECK THE BCM VOLTAGE SUPPLY	
• Ignition OFF. • Disconnect: BCM C2280G. • Measure the **voltage** between:	**Yes** GO to K2 . **No** REPAIR the circuit.

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2280G-1	SBB18 (YE)	-	Ground

C2280G-2	SBB17 (RD)	-	Ground



- **Are the voltages greater than 11 volts?**

K2 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test L: DTC U3008:13

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 10 , Grounds for schematic and connector information.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3008:13	Control Module Ground "A: Circuit Open	Sets in the BCM if one of the module grounds is open.

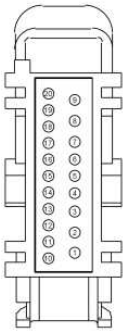
Possible Sources

- Wiring, terminals or connectors
- BCM

PINPOINT TEST L: DTC U3008:13

Test Step	Result / Action to Take
L1 CHECK THE BCM POWER GROUND	
• Ignition OFF. • Disconnect: BCM C2280E. • Measure the **resistance** between:	**Yes** GO to L2 . **No** REPAIR the circuit.

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2280E-2	GD140 (BK/GY)	-	Ground



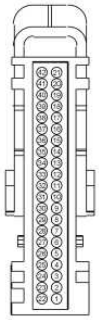
• **Is the resistance less than 3 ohms?**

L2 CHECK THE BCM PROCESSOR GROUND	

<table>
<tr>
<td>

- Disconnect: BCM C2280A.
- Measure the **resistance** between:

<table>
<tr><td>Positive</td><td>Lead</td><td>Negative</td><td>Lead</td></tr>
<tr><td>Pin</td><td>Circuit</td><td>Pin</td><td>Circuit</td></tr>
<tr><td>C2280A-3</td><td>GD123 (BK/GY)</td><td>-</td><td>Ground</td></tr>
</table>



- **Is the resistance less than 3 ohms?**

</td>
<td>

Yes
GO to L3 .

No
REPAIR the circuit.

</td>
</tr>
<tr>
<td>

L3 CHECK FOR CORRECT BCM OPERATION

</td>
<td></td>
</tr>
<tr>
<td>

- Disconnect and inspect all BCM connectors.
- Repair:
  - ♦ corrosion (install new cnector or terminals - clean module pins)
  - ♦ damaged or bent pins - install new terminals/pins
  - ♦ pushed-out pins - install new pins as necessary
- Reconnect the BCM connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.
- **Is the concern still present?**

</td>
<td>

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM REFER to Body Control Module (BCM) .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

</td>
</tr>
</table>

Pinpoint Test M: DTC U3003:16

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 10 , Grounds for schematic and connector information.

Refer to Wiring Diagrams Cell 13 , Power Distribution/BCM for schematic and connector information.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	Sets in the BCM if the BCM detects battery voltage below 9 volts on the voltage supply input.

Possible Sources

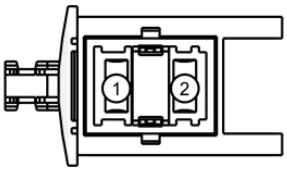
- Wiring, terminals or connectors
- Charging system
- Battery
- BCM

PINPOINT TEST M: DTC U3003:16

Test Step	Result / Action to Take
M1 CARRY OUT THE BCM SELF-TEST	
NOTE: DTC U3003:16 will not clear unless the battery voltage is greater than 13V for 2 minutes. • Ignition ON. • Using a scan tool, clear the DTCs. • Ignition OFF. • Ignition ON. • Wait 10 seconds. • Using a scan tool, perform the BCM self-test. • **Is DTC U3003:16 still present?**	**Yes** GO to M2 . **No** The system is operating correctly at this time. The DTC may have been set due to a previous low battery voltage condition.
M2 CHECK FOR CHARGING SYSTEM DTCs IN THE BCM	
• Using a scan tool, retrieve all continuous memory DTCs.	**Yes** REFER to Section 414-00 . **No**

• **Are any charging system DTCs recorded?**	GO to M3 .
M3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE	
• Check the battery condition and verify the battery is fully charged. Refer to Section 414-01 . • **Is the battery OK and fully charged?**	**Yes** GO to M4 . **No** REFER to Section 414-01 .
M4 CHECK THE BCM VOLTAGE SUPPLY	
• Ignition OFF. • Disconnect: BCM C2280G. • Ignition ON. • Measure the **voltage** between:	**Yes** GO to M5 . **No** VERIFY the high current BJB fuse 9 (50A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagram manual to identify the possible causes for the short circuit.

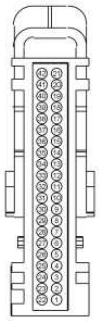
Positive	Lead	Negative	Lead
Pin	Circuit	Pin	Circuit
C2280G-1	SBB18 (YE)	-	Ground
C2280G-2	SBB17 (RD)	-	Ground



• **Are the voltages greater than 11 volts?**	
M5 CHECK THE BCM PROCESSOR GROUND	
• Disconnect: BCM C2280A. • Measure the **resistance** between:	**Yes** GO to M6 . **No** REPAIR the circuit.

Positive	Lead	Negative	Lead

Pin	Circuit	Pin	Circuit
C2280A-3	GD123 (BK/GY)	-	Ground



- **Is the resistance less than 3 ohms?**

M6 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test N: DTC U3003:17

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 10 , Grounds for schematic and connector information.

Refer to Wiring Diagrams Cell 13 , Power Distribution/BCM for schematic and connector information.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	Sets in the BCM if the BCM detects battery voltage above 16 volts on the voltage supply input

Possible Sources

- Charging system
- BCM

PINPOINT TEST N: DTC U3003:17

Test Step	Result / Action to Take
N1 CHECK FOR DTCs B1317, B1676, P0563 (PCM), U3003:17 OR U3006:17 SET IN OTHER MODULES	
• Ignition ON. • Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC B1317, B1676, U3003:17, U3006:17 or P0563 (PCM) set in more than one module?**	**Yes** REFER to Section 414-00 . **No** GO to N2 .
N2 CHECK THE BATTERY VOLTAGE	
• Turn off all interior/exterior lights and accessories. • Start and run the engine at approximately 2,000 rpm for 3 minutes while monitoring the battery voltage. • **Does the battery voltage rise to 15.9 volts or higher?**	**Yes** REFER to Section 414-00 . **No** GO to N3 .
N3 RECHECK FOR DTC U3003:17	
• Turn the engine off. • Ignition ON. • Using a scan tool, perform the self-test. • Clear the continuous memory DTCs. • Carry out the BCM self-test. • **Is DTC U3003:17 present?**	**Yes** INSTALL a new BCM . REFER to Body Control Module (BCM) . **No** The system is operating normally at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

Pinpoint Test O: DTC B1206:11

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 23 , Electronic Enigne Controls for schematic and connector information.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1206:11	Crash Occurred: Circuit Short To Ground	Sets in the BCM if the BCM detects a short to ground on the crash event signal output to the PCM.

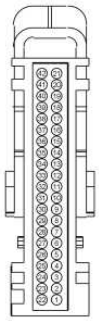
Possible Sources

- Charging system
- BCM

PINPOINT TEST O: DTC B1206:11

Test Step	Result / Action to Take
O1 CHECK THE PCM FOR A SHORT TO GROUND	
• Ignition OFF. • Disconnect: PCM C1551B. • Ignition ON. • Using a scan tool, clear the DTCs. • Using a scan tool, perform the BCM self-test. • **NOTE:** Disregard DTC B1206:15 during this step. DTC B1206:15 sets with the PCM disconnected. • **Is DTC B1206:11 still present?**	**Yes** GO to O2 . **No** INSTALL a new PCM. REFER to Section 303-14 .
O2 CHECK THE CRASH EVENT SIGNAL CIRCUIT FOR A SHORT TO GROUND	
• Ignition OFF. • Disconnect: BCM C2280A. • Measure the **resistance** between:	**Yes** GO to O3 . **No** REPAIR the circuit.

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C2280A-5	VE518 (BN/WH)	-	Ground

 • **Is the resistance greater than 10,000 ohms?**	
O3 CHECK FOR CORRECT BCM OPERATION td>	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test P: DTC B1206:15

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 23 , Electronic Engine Controls for schematic and connector information.

Normal Operation and Fault Conditions

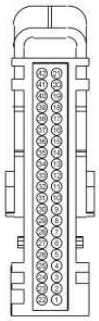
DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1206:15	Crash Occurred: Circuit Short To Battery Or Open	Sets in the BCM if the BCM detects an open or short to voltage on the crash event signal output to the PCM.

Possible Sources

- Wiring, terminals or connectors
- BCM
- PCM

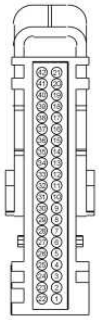
PINPOINT TEST P: DTC B1206:15

<table>
<tr><th>Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>P1 CHECK THE PCM FOR A SHORT TO VOLTAGE</td><td></td></tr>
<tr><td>
• Ignition OFF.
• Disconnect: PCM C1551B.
• Connect a fused jumper wire between:
<table>
<tr><th colspan="2">Lead 1</th><th colspan="2">Lead 2</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C2280A-5</td><td>VE518 (BN/WH)</td><td>-</td><td>Ground</td></tr>
</table>

• Ignition ON.
• Using a scan tool, clear the DTCs.
• Using a scan tool, perform the BCM self-test.
• NOTE: Disregard DTC B1206:11 during this sp. DTC B1206:11 sets with the PCM disconnected.
• Is DTC B1206:15 still present?
</td><td>
Yes
REMOVE the jumper wire. GO to P2 .

No
REMOVE the jumper wire. INSTALL a new PCM. REFER to Section 303-14 .
</td></tr>
<tr><td>P2 CHECK THE CRASH EVENT SIGNAL FOR A SHORT TO VOLTAGE</td><td></td></tr>
<tr><td>
• Ignition OFF.
• Disconnect: BCM C2280A.
• Ignition ON.
• Measure the voltage between:
<table>
<tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr>
<tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr>
<tr><td>C2280A-5</td><td></td><td>-</td><td>Ground</td></tr>
</table>
</td><td>
Yes
REPAIR the circuit.

No
GO to P3 .
</td></tr>
</table>

	VE518 (BN/WH)		

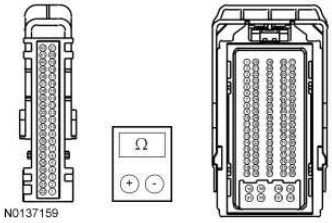


- **Is any voltage present?**

P3 CHECK THE CRASH EVENT SIGNAL FOR AN OPEN

- Ignition OFF.
- Measure the **resistance** between:

Positive	Lead	Negative	Lead
Pin	Circuit	Pin	Circuit
C2280A-5	VE518 (BN/WH)	C1551B-29	VE518 (BN/WH)



- **Is the resistance less than 3 ohms?**

Yes
GO to P4 .

No
REPAIR the circuit.

P4 CHECK FOR CORRECT BCM OPERATION

- Disconnect and inspect all BCM connectors.
- Repair:
  - corrosion (install new connector or terminals - clean module pins)
  - damaged or bent pins - install new terminals/pins
  - pushed-out pins - install new pins as necessary
- Reconnect the BCM connectors. Make sure they seat and latch correctly.

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM . REFER to Body Control Module (BCM) .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

• Operate the system and determine if the concern is still present. • **Is the concern still present?**	

Pinpoint Test Q: DTC U0230:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0230:00	Lost Communication With Rear Gate Module: No Sub Type Information	Sets in the a BCM if messages are not received from the LTM over the MS-CAN .

Possible Sources

- BCM
- LTM

PINPOINT TEST Q: DTC U0230:00

Test Step	Result / Action to Take
Q1 VERIFY THE CUSTOMER CONCERN	
• Ignition ON. • Verify there is an observable symptom present. • **Is an observable symptom present?**	**Yes** GO to Q2 . **No** The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
Q2 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Using a scan tool, perform a network test. • **Does the LTM pass the network test?**	**Yes** GO to Q3 . **No** REFER to Section 418-00 , The LTM Does Not Respond To The Scan Tool.
Q3 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	
	Yes For DTC U3003:16, GO to Pinpoint Test M .

• Using a scan tool, perform the BCM self-test. • **Is DTC U3003:16 or DTC U3003:17 recorded?**	For DTC U3003:17, GO to Pinpoint Test N . **No** GO to Q4 .
Q4 RETRIEVE THE RECORDED DTCs FROM THE LTM SELF-TEST	
• Using a scan tool, perform the LTM self-test. • **Is DTC U3003:62 recorded?**	**Yes** Section 501-03 . **No** GO to Q5 .
Q5 RECHECK THE BCM DTCs	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out. • Clear the DTCs. • Ignition OFF. • Wait 10 seconds. • Ignition ON. • Using a scan tool, perform the BCM self-test. • **Is DTC U0230:00 still present?**	**Yes** GO to Q6 . **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
Q6 CHECK FOR DTC U0230:00 SET IN OTHER MODULES	
• Clear all DTCs. • Ignition OFF. • Wait 10 seconds. • Ignition ON. • Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC U0230:00 set in other modules?**	**Yes** GO to Q7 . **No** GO to Q8 .
Q7 CHECK FOR CORRECT LTM OPERATION	
• Disconnect and inspect all LTM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the LTM connectors. Make sure they seat and latch correctly.	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new LTM . REFER to Section 501-03 . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

• Operate the system and determine if the concern is still present. • **Is the concern still present?**	
Q8 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test R: DTC B10A2:02

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

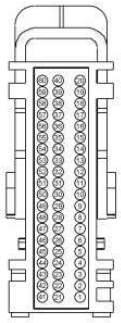
DTC	Description	Fault Trigger Conditions
B10A2:02	Crash Input General Failure Information: General Signal Failure	Sets in the BCM if the 5 volt signal from the RCM is missing.

Possible Sources

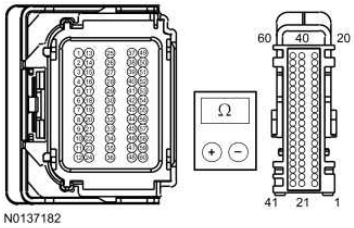
- Wiring, terminals or connectors
- BCM
- RCM

PINPOINT TEST R: DTC B10A2:02

Test Step	Result / Action to Take
R1 CONFIRM THAT THE DTC RESETS	

• Ignition ON. • Using a scan tool, clear the BCM DTCs. • Road test the vehicle. • Using a scan tool, perform BCM self-test. • **Is BCM DTC B10A2:02 retrieved?**	**Yes** If only BCM DTC B10A2:02 is retrieved, GO to R2 . If BCM DTC U0151:00 is retrieved, REPAIR the DTC. GO to Pinpoint Test D . **No** The system is operating correctly at this time. The DTC may have been falsely set by a RCM self-test, causing the signal to momentarily stop and set the DTC.
R2 CHECK FOR RCM DTCs	
• Using a scan tool, perform the RCM self-test. • **Are any RCM DTCs retrieved?**	**Yes** REPAIR all RCM DTCs. REFER to Section 501-20B . **No** GO to R3 .
R3 CHECK FOR VOLTAGE FROM THE RCM	
• Ignition OFF. • Disconnect: BCM C2280C. • Ignition ON. • Measure the **voltage** between: Positive Lead / Negative Lead Pin / Circuit / Pin / Circuit C2280C-51 / CR115 (BN) / - / Ground  • **Is the voltage greater than 5 volts?**	**Yes** GO to R6 . **No** GO to R4 .
R4 CHECK THE EVENT NOTIFICATION SIGNAL CIRCUIT FOR AN OPEN	
• Ignition OFF. • Depower the SRS . REFER to Section 501-20B . • Disconnect: RCM C310B. • Measure the **resistance** between:	**Yes** GO to R5 . **No** REPAIR the circuit.

Positive	Lead	Negative	Lead
Pin	Circuit	Pin	Circuit
C310B-42	CR115 (BN)	C2280C-51	CR115 (BN)



- **Is the resistance less than 3 ohms?**

Refer to Wiring Diagrams Cell 5 , Connector Repair Procedures for schematic and connector information.

R5 CONFIRM THE RCM FAULT

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, DTCs will be recorded.

- Ignition OFF.
- Prior to reconnecting any previously disconnected SRS component:
  - inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.
  - inspect wire harness for any damaged, pinched, cut or pierced wires.
  - inspect RCM C310A and C310B CPA lever/lock for correct operation. REFER to RCM removal and installation instructions in Section 501-20B .
  - repair any concerns found.

    Refer to Wiring Diagrams Cell 5 , Connector Repair Procedures for schematic and connector information.
- Connect: BCM C2280C.
- Connect: RCM C310A and C310B.
- Repower the SRS . Do not prove out the SRS at this time. REFER to Section 501-20B .
- Ignition ON.
- Using a scan tool, perform the BCM self-test.
- **Was the original DTC retrieved on-demand during self-test?**

Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new RCM . REFER to Section 501-20B .

No
The fault is not present at this time. The fault may have been caused by a loose or corroded connector. REPAIR the root cause of any connector or terminal issues.

R6 CHECK FOR CORRECT BCM OPERATION

• Disconnect and inspect all BCM connectors. • Repair: ♦ corrosion (install new connector or terminals - clean module pins) ♦ damaged or bent pins - install new terminals/pins ♦ pushed-out pins - install new pins as necessary • Reconnect the BCM connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • **Is the concern still present?**	**Yes** CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM REFER to Body Control Module (BCM) . **No** The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Remote Function Actuator (RFA) Module

DTC Charts

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Remote Function Actuator (RFA) Module DTC Chart

DTC	Description	Action
B102B:00	Passive Key: No Sub Type Information	REFER to Section 419-01C .
B102B:05	Passive Key: System Programming Failure	REFER to Section 419-01C .
B10C1:24	Left Front Unlock Pull Switch: Signal Stuck High	REFER to Section 501-14B .
B10C2:24	Left Rear Unlock Pull Switch: Signal Stuck High	REFER to Section 501-14B .
B10C3:24	Right Front Unlock Pull Switch: Signal Stuck High	REFER to Section 501-14B .
B10C4:24	Right Rear Unlock Pull Switch: Signal Stuck High	REFER to Section 501-14B .
B10C5:24	Trunk Unlock Pull Switch: Signal Stuck High	REFER to Section 501-14B .
B10C6:1F	Exterior Trunk Antenna: Circuit Intermittent	REFER to Section 501-14B .
B10C7:1F	Interior Trunk Antenna: Circuit Intermittent	REFER to Section 419-01C .
B10C8:1F	Interior Centre Antenna: Circuit Intermittent	REFER to Section 419-01C .
B10C9:1F	Interior Front Antenna: Circuit Intermittent	REFER to Section 419-01C .
B10CA:1F	Left Rear Door Handle Antenna: Circuit Intermittent	REFER to Section 501-14B .
B10CB:1F	Right Rear Door Handle Antenna: Circuit Intermittent	REFER to Section 501-14B .

B10D1:24	Left Front Lock Button: Signal Stuck High	REFER to Section 501-14B .
B10D3:24	Right Front Lock Button: Signal Stuck High	REFER to Section 501-14B .
B11CC:51	Immobilizer Keyless Vehicle Secret Key: Not Programmed	REFER to Section 501-14B .
B1361:00	Front Right Door Handle Lock Circuit: No Sub Type Information	REFER to Section 501-14B .
B1365:00	Front Left Door Handle Lock Circuit: No Sub Type Information	REFER to Section 501-14B .
B1367:00	Right Rear Door Handle Unlock Circuit: No Sub Type Information	REFER to Section 501-14B .
B136F:00	Left Front Door Handle Unlock Circuit: No Sub Type Information	REFER to Section 501-14B .
B1370:23	Door Handle Ground Supply: Signal Stuck Low	REFER to Section 501-14B .
B1370:24	Door Handle Ground Supply: Signal Stuck High	REFER to Section 501-14B .
B1372:00	Left Rear Door Handle Unlock Circuit: No Sub Type Information	REFER to Section 501-14B .
B1373:00	Front Right Door Handle Unlock Circuit: No Sub Type Information	REFER to Section 501-14B .
B1399:00	Personalized Key Synchronization: No Sub Type Information	REFER to Section 419-01C .
U0010:00	Medium Speed CAN Communication Bus: No Sub Type Information	The module cannot communicate on the network at a point in time. The fault is not currently present (the module had to communicate with the scan tool to report this DTC). VERIFY the integrity of the connectors and wiring. Refer to Wiring Diagrams Cell 14 , Module Communications Network for schematic and connector information. If no faults are found, INSTALL a new RFA module. REFER to Remote Function Actuator (RFA) Module .
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test S .
U0300:00	Internal Control Module Software Incompatibility: No Sub Type Information	CLEAR the DTCs and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new RFA module. REFER to Remote Function Actuator (RFA) Module .
U201B:54		

	Control Module Calibration Data #2: Missing Calibration	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section 418-01 . If there have been no recent service actions, INSTALL a new RFA module. REFER to Remote Function Actuator (RFA) Module .
U201F:00	External Receiver: No Sub Type Information	REFER to Section 419-01B .
U201F:13	External Receiver: No Sub Type Information	REFER to Section 419-01B .
U201F:87	External Receiver: Missing Message	REFER to Section 419-01B .
U2100:00	Initial Configuration Not Complete: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section 418-01 . If there have been no recent service actions, INSTALL a new RFA module. REFER to Remote Function Actuator (RFA) Module .
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section 418-01 . If there have been no recent service actions, INSTALL a new RFA module. REFER to Remote Function Actuator (RFA) Module .
U3000:49	Control Module: Internal Electronic Failure	INSTALL a new RFA module. REFER to Remote Function Actuator (RFA) Module .
U3002:81	Vehicle Identification Number: Invalid Serial Data Received	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure. REFER to Section 418-01 . If there have been no recent service actions, INSTALL a new RFA module. REFER to Remote Function Actuator (RFA) Module .
U3003:62	Battery Voltage: Signal Compare Failure	GO to Pinpoint Test T .

Symptom Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Symptom Chart

Pinpoint Tests

Pinpoint Test S: DTC U0140:00

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	Sets in the RFA module if messages received from the BCM over the MS-CAN are missing.

Possible Sources

- BCM
- RFA module

PINPOINT TEST S: DTC U0140:00

Test Step	Result / Action to Take
S1 VERIFY THE CUSTOMER CONCERN	
• Ignition ON. • Verify there is an observable symptom present. • **Is an observable symptom present?**	**Yes** GO to S2 . **No** The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
S2 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Using a scan tool, perform a network test. • **Does the BCM pass the network test?**	**Yes** GO to S3 . **No** REFER to Section 418-00 , The BCM Does Not Respond To The Scan Tool.
S3 RETRIEVE THE RECORDED DTCs FROM THE RFA MODULE SELF-TEST	
• Using a scan tool, perform the RFA module self-test. • **Is DTC U3003:62 recorded?**	**Yes** GO to Pinpoint Test S . **No** GO to S4 .
S4 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST	

• Using a scan tool, perform the BCM self-test. • **Is DTC U3003:16 or U3003:17 recorded?**	**Yes** For DTC U3003:16, GO to Pinpoint Test M . For DTC U3003:17, GO to Pinpoint Test N . **No** GO to S5 .
S5 RECHECK THE RFA MODULE DTCs	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out. • Clear the DTCs. • Wait 10 seconds. • Using a scan tool, perform the RFA module self-test. • **Is DTC U0140:00 still present?**	**Yes** GO to S6 . **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.
S6 CHECK FOR DTC U0140:00 SET IN OTHER MODULES	
NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out. • Clear all DTCs. • Ignition OFF. • Ignition ON. • Wait 10 seconds. • Using a scan tool, retrieve all continuous memory DTCs. • **Is DTC U0140:00 set in the IPC ?**	**Yes** INSTALL a new RFA module. REFER to Remote Function Actuator (RFA) Module . **No** INSTALL a new BCM . REFER to Body Control Module (BCM) .

Pinpoint Test T: DTC U3003:62

Diagnostic Overview

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Refer to Wiring Diagrams Cell 10 , Grounds for schematic and connector information.

Refer to Wiring Diagrams Cell 13 , Power Distribution/BCM for schematic and connector information.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

U3003:62	Battery Voltage: Signal Compare Failure	Sets when the RFA module has disabled a circuit due to a repetitive circuit overload and a progressive threshold is met.

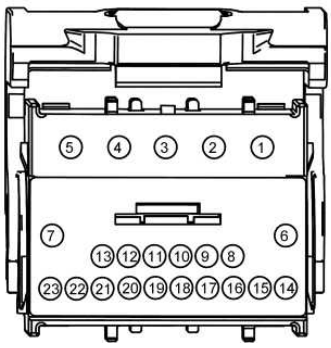
Possible Sources

- Wiring, terminals or connectors
- Battery
- Generator
- PCM
- RFA module

PINPOINT TEST T: DTC U3003:62

Test Step	Result / Action to Take
T1 CHECK THE RFA MODULE VOLTAGE SUPPLY	
• Ignition ON. • Measure and record the battery voltage. • Ignition OFF. • Disconnect: RFA Module C4392C. • Ignition ON. • Measure the **voltage** between:	**Yes** GO to T2 . **No** REPAIR the circuit.

Positive	Lead	Negative	Lead
Pin	Circuit	Pin	Circuit
C4392C-5	SBR08 (VT/RD)	-	Ground



- **Is the voltage measured at the RFA module within 2 volts of the voltage measured at the battery?**

T2 CHECK THE RFA MODULE GROUND	

<table>
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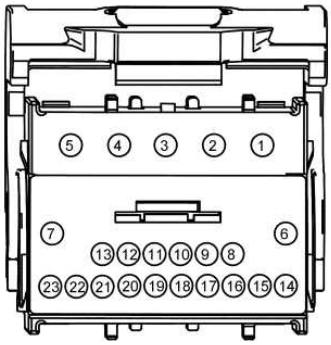
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C4392C-5	SBR08 (VT/RD)	C4392C-4	GD143 (BK/VT)



- **Is the voltage greater than 11 volts?**

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Yes
GO to T3 .

No
REPAIR the circuit.

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T3 CHECK FOR CORRECT RFA MODULE OPERATION

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- Disconnect and inspect all the RFA module connectors.
- Repair:
  - corrosion (install new connector or terminals - clean module pins)
  - damaged or bent pins - install new terminals/pins
  - pushed-out pins - install new pins as necessary
- Reconnect the RFA module connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.
- **Is the concern still present?**

</td>
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Yes
CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new RFA module. REFER to Remote Function Actuator (RFA) Module .

No
The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

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Disabling Transport Mode

⚠ **WARNING: Before beginning any service procedure in this section, refer to Safety Warnings in Section 100-00 . Failure to follow this instruction may result in serious personal injury.**

1. Place the ignition in the OFF position.
2. Verify the battery is fully charged. Refer to Section 414-01 .
3. Place the ignition in the ON position.

NOTE: Steps 4 and 5 must be carried out within 10 seconds.

4. Press and release the brake pedal 5 times.
5. Press and release the hazard switch 4 times (on, off, on, off).

Body Control Module (BCM)

Removal

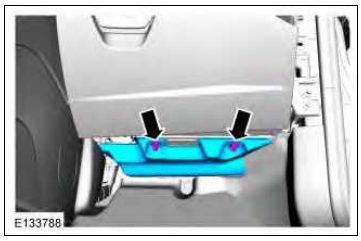
NOTE: If installing a new Body Control Module (BCM), verify at least 2 of the vehicle keys are available prior to carrying out this procedure.

NOTE: For a job aid on programming the BCM ; from the On-Line Automotive Service Information System (OASIS) tab, select the "Service Tips" tab, then select " BCM Programming" under "Job Aids".

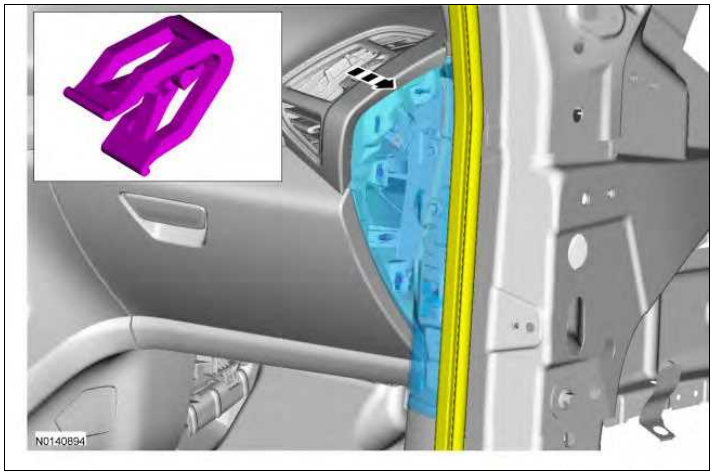
1. **NOTE:** If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

   Upload the module configuration information from the BCM into the scan tool by following the scan tool on screen instructions. Refer to Section 418-01 .

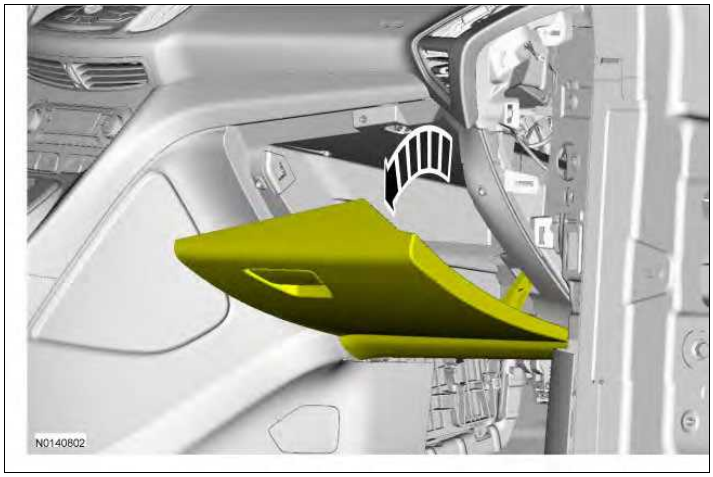
2. Remove the 2 instrument panel insulator retainers and the instrument panel insulator.



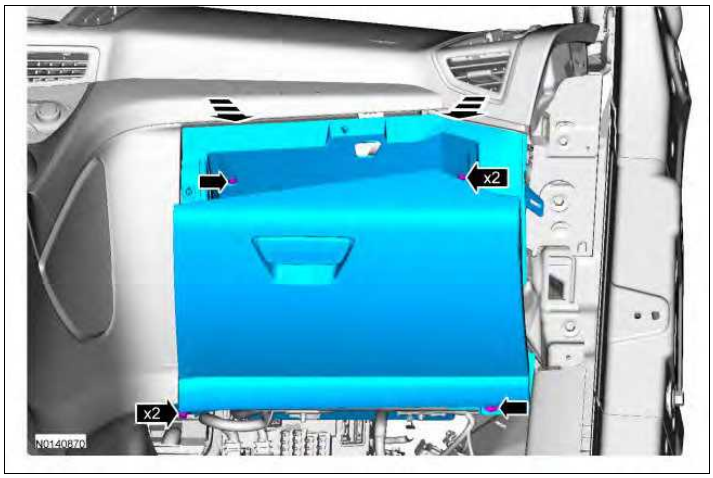
3. Remove the RH instrument panel side trim panel.



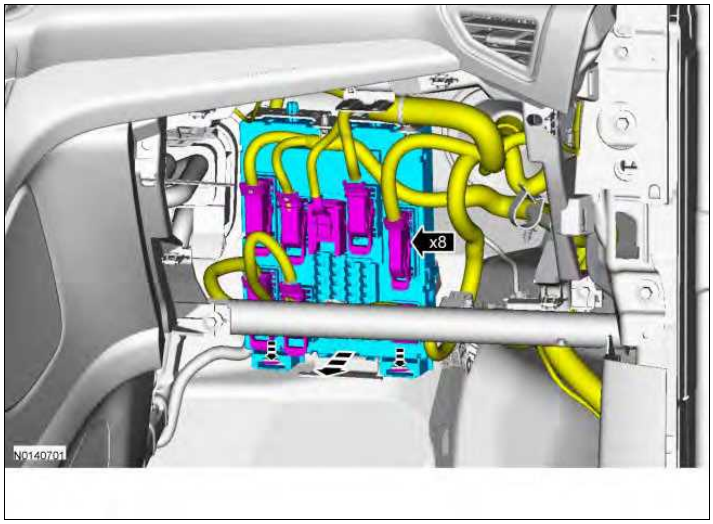
4. Op compartment door.



5. Remove the 4 glove compartment retainers and the glove compartment.



6. Disconnect the 8 BCM electrical connectors, release the 2 clips and remove the BCM .

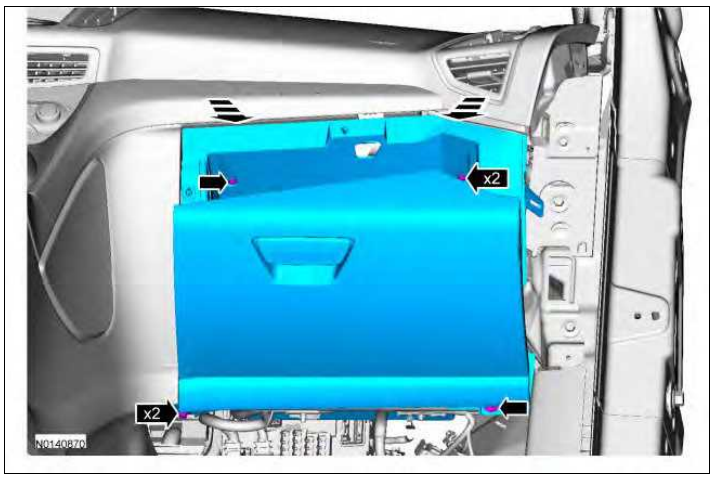


Installation

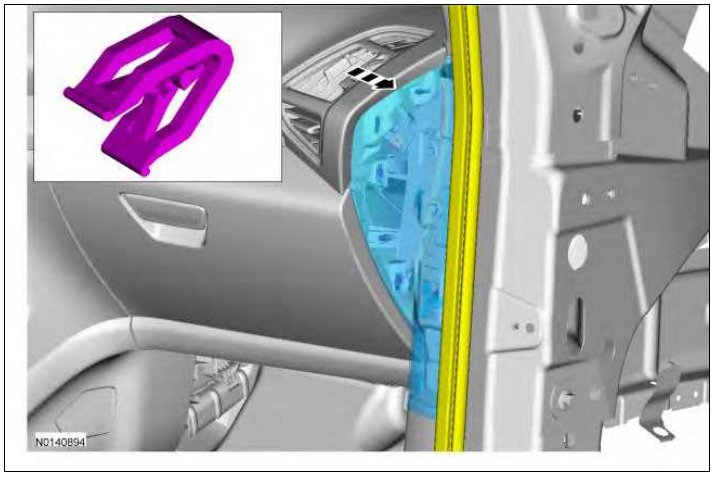
NOTE: If installing a new BCM on vehicles with Intelligent Access (IA), the ignition cannot be turned on until a parameter reset is performed and 2 keys are programmed to the vehicle. The BCM still communicates with the scan tool with the ignition OFF. Use the previous scan tool session or start a scan tool session using the PCM part number or tear tag number located on the PCM .

1. Install the BCM and connect the 8 BCM electrical connectors.

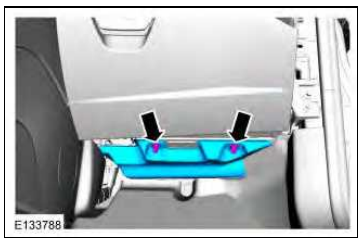
2. Install the glove compartment and the glove compartment retainers.



3. Install the RH instrument panel side trim panel.



4. Install the instrument panel insulator and the 2 instrument panel insulator retainers.



5. **NOTE:** Carry out Steps 5-13 only if installing a new BCM .

   Obtain the As-Built data from Professional Technician Society (PTS) OASIS . Download the As-Built data to the scan tool or other storage device, such as a flash drive, following the on-screen instructions.

6. Using the previous scan tool session, carry out the Programmable Module Installation (PMI) procedure for the BCM .

7. For vehicles without IA , remove the key from the ignition until Step 9. For vehicles with IA , turn the

ignition OFF and leave it OFF until Step 9.

8. Using the scan tool, select Tool Box/Module Programming/Programmable Parameters/Car Configuration Parameter(s)/Vehicle Configuration/Retrieve PTS Derived As-built Data. Follow the on-screen instructions to install the as-built data into the BCM .

9. Carry out the parameter reset. Refer to Section 419-01B . or Section 419-01C .

10. Carry out the key programming procedure. Refer to Section 419-01B . or Section 419-01C .

11. To configure the customer preference programmable parameters, refer to Section 418-01 .

12. Train the tire pressure sensors. Refer to Section 204-04B .

13. Carry out the BCM self-test (must include an on-demand self-test) and then repeat the self-test to confirm all DTCs have been cleared.

Remote Function Actuator (RFA) Module

Removal

All vehicles

NOTE: If installing a new Remote Function Actuator (RFA) module, verify at least 2 of the vehicle keys are available prior to carrying out this procedure.

1. **NOTE:** If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

   Upload the module configuration information from the RFA module into the scan tool by following the scan tool on screen instructions.

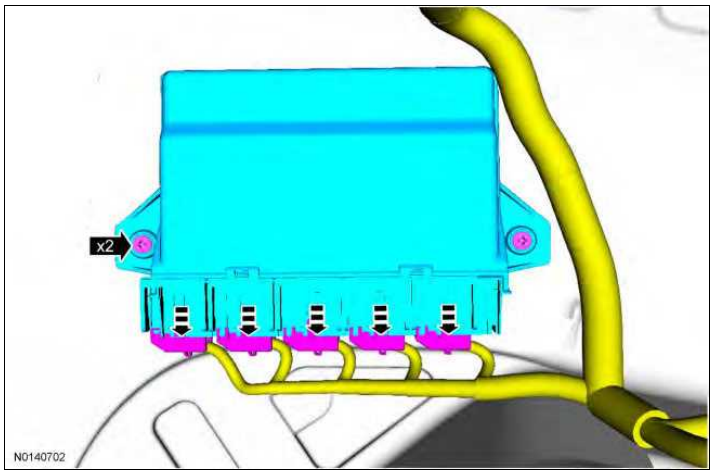
2. Remove the LH quarter trim panel. Refer to Section 501-05 .

Sony® sound

3. Remove the subwoofer. Refer to Section 415-00D .

All vehicles

4. Remove the 2 retainers and the RFA module.
   - Disconnect the 5 electrical connectors.



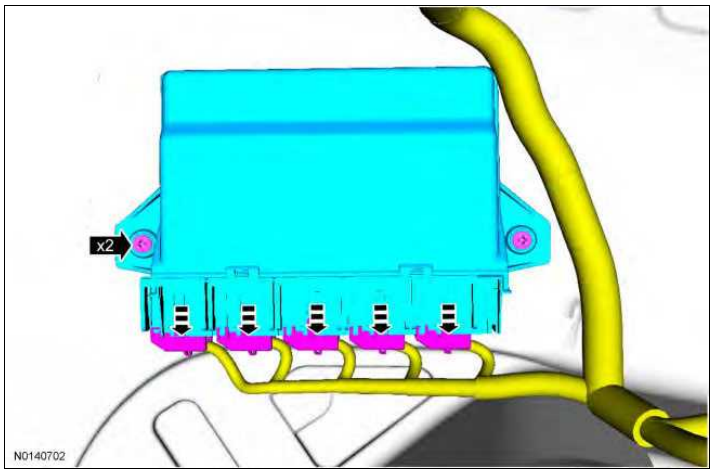
Installation

NOTE: If insalling a new RFA module, the ignition cannot be turned ON until a parameter reset is performed and 2 keys are programmed to the vehicle. The RFA module still communicates with the scan tool with the ignition OFF. Use the previous scan tool session or start a scan tool session using the PCM part number or tear tag.

All vehicles

1. Install the RFA module and the 2 retainers.

- Connect the 5 electrical connectors.
- Tighten to 10 Nm (89 lb-in).



Sony® sound

2. Install the subwoofer. Refer to Section 415-00D .

All vehicles

3. Install the LH quarter trim panel. Refer to Section 501-05 .

4. If installing a new RFA module carry out the parameter reset. Refer to Section 419-01B or Refer to Section 419-01C .

5. If installing a new RFA module carry out the key programming procedure. Refer to Section 419-01B . or Refer to Section 419-01C .

6. Download the RFA module configuration information from the scan tool to the new RFA module by following the scan tool on screen instructions.

7. Carry out the RFA module self-test (must include an on-demand self-test) and then repeat the self-test to confirm all DTCs have been cleared.

Material

Item	Specification	Fill Capacity
High Temperature Nickel Anti-Seize Lubricant XL-2	-	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A	-
Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada)	-	-

Torque Specifications

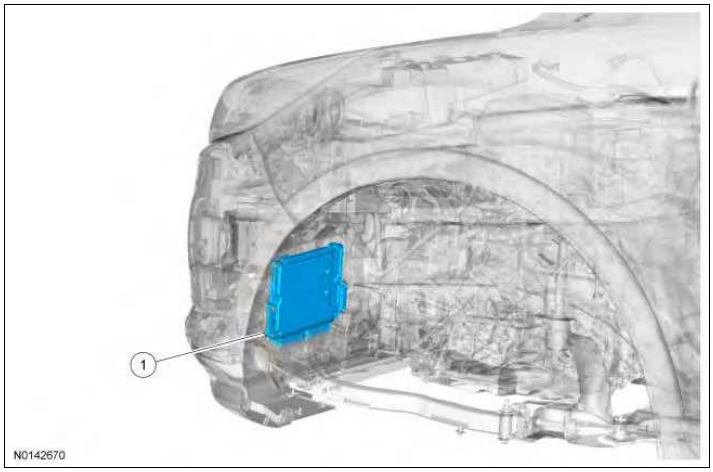
Description	Nm	lb-in
CMP sensor bolt - 1.6L GTDI	8	71
CMP sensor bolt - 2.0L GTDI	6	53
CMP sensor bolt - 2.5L	9	80
Catalyst monitor sensor [a]	-	-
CKP sensor bolt 1.6L GTDI	8	71
CKP sensor bolts 2.0L GTDI , 2.5L [a]	-	-
CHT sensor - 2.0L GTDI	10	89
CHT sensor - 2.5L	12	106
Engine plug bolt	20	177
FRP [a]	-	-
HO2S [a]	-	-
IAT sensor screws	10	89
KS bolt - 1.6L GTDI	18	159
KS bolt - 2.0L GTDI , 2.5L	20	177
MAP sensor screw	3	27
MAPT sensor screw	3	27
MAF sensor screws	10	89
VCT oil control solenoid bolt - 1.6L GTDI	8	71
VCT oil control solenoid bolt - 2.0L GTDI , 2.5L	10	89

[a] Refer to the procedure for specification.

Electronic Engine Controls

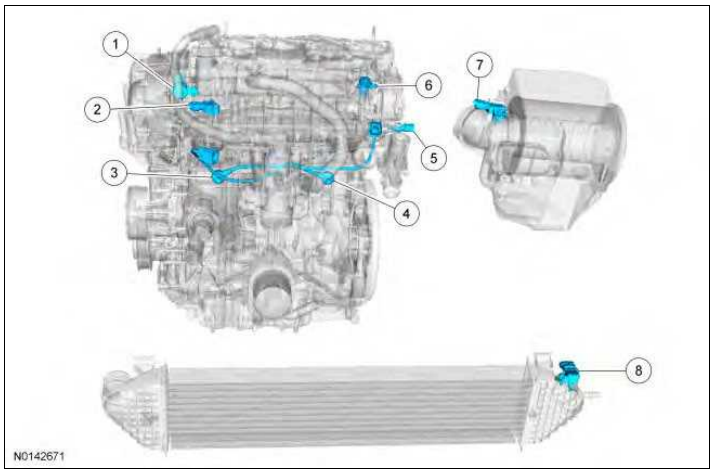
Component Location

PCM Location



Item	Description	Comments
1	PCM	-

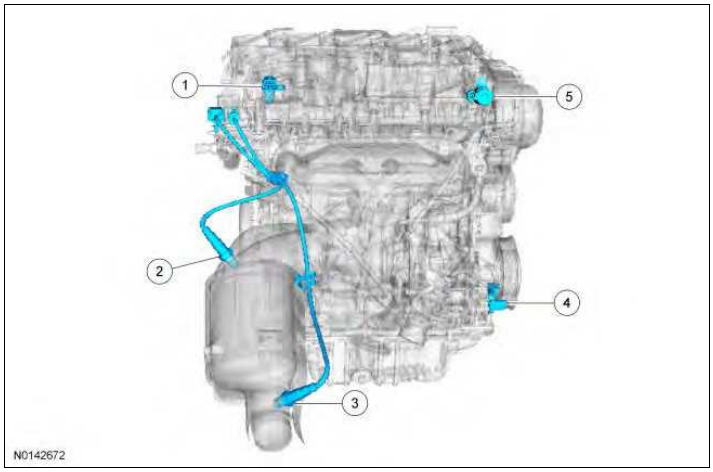
LH Engine Sensor Locations - 1.6L GTDI



Item	Description	Comments
1	Intake camshaft VCT oil control solenoid	-
2	MAP sensor	-
3	Front KS	-
4	Rear KS	-

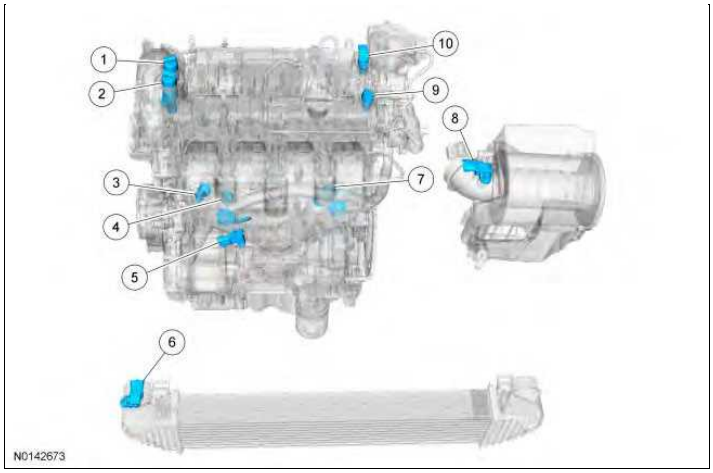
5	ECT sensor	-
6	Intake camshaft CMP sensor	-
7	IAT sensor	-
8	MAPT sensor	-

RH Engine Sensor Locations - 1.6L GTDI



Item	Description	Comments
1	Exhaust camshaft CMP sensor	-
2	HO2S	-
3	CMS	-
4	CKP sensor	-
5	Exhaust camshaft VCT oil control solenoid	-

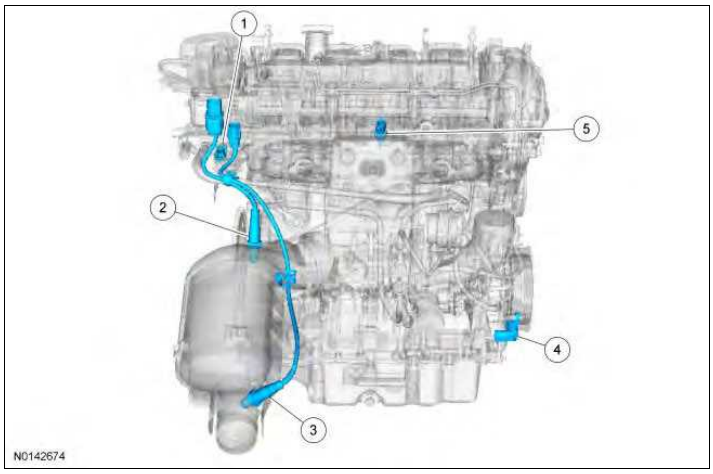
LH Engine Sensor Locations - 2.0L GTDI



Item	Description	Commen/TR>
1	Exhaust VCT oil control solenoid	-
2	Intake VCT oil control solenoid	-

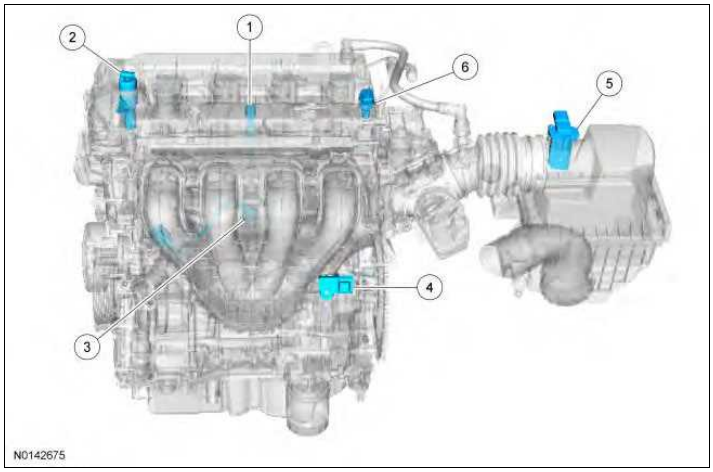
3	FRP sensor	-
4	Front KS	-
5	MAP sensor	-
6	MAPT sensor	-
7	Rear KS	-
8 n="top" align="left">IAT sensor	-	
9	Intake CMP sensor	-
10	Exhaust CMP sensor	-

RH Engine Sensor Locations - 2.0L GTDI



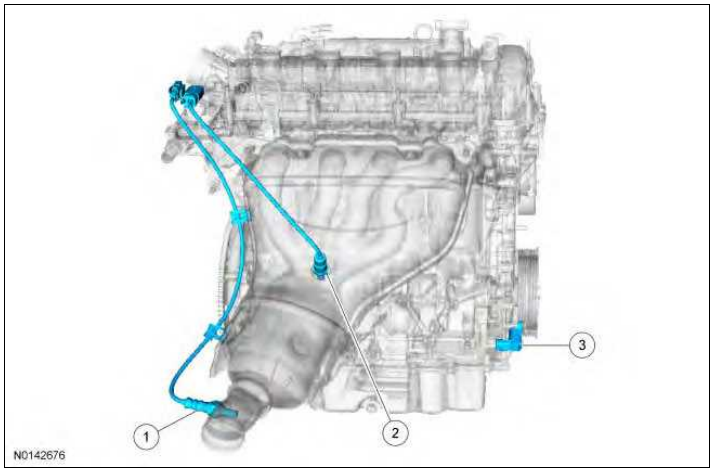
Item	Description	Comments
1	ECT sensor	-
2	HO2S	-
3	CMS	-
4	CKP sensor	-
5	CHT sensor	-

LH Engine Sensor Locations - 2.5L



Item	Description	Comments
1	CHT sensor	-
2	VCT oil control solenoid	-
3	KS	-
4	MAP sensor	-
5	MAF sensor	-
6	CMP sensor	-

RH Engine Sensor Locations - 2.5L



Item	Description	Comments
1		-
2	HO2S	-
3	CKP sensor	-

Electronic Engine Controls

DTC Charts

PCM DTC Chart

DTC	Description	Action to Take
P0125	Insufficient Coolant Temp For Closed Loop Fuel Control	REFER to Section 303-03 .
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	REFER to Section 303-03 .
P0217	Engine Coolant Overtemperature Condition	REFER to Section 303-03 .
P0512	Starter Request Circuit	REFER to Section 303-06 .
P0532	A/C Refrigerant Pressure Sensor A Circuit Low	REFER to Section 412-00A or Section 412-00B .
P0533	A/C Refrigerant Pressure Sensor A Circuit High	REFER to Section 412-00A or Section 412-00B .
P0563	System Voltage High	REFER to Section 414-00 .
P0579	Cruise Control Multi-Function Input A Circuit Range/Performance	REFER to Section 419-03 .
P0581	Cruise Control Multi-Function Input A Circuit High	REFER to Section 419-03 .
P0602	Powertrain Control Module Programming Error	REFER to Section 418-01 .
P0605	Internal Control Module Read Only Memory (ROM) Error	REFER to Section 418-01 .
P0620	Generator Control Circuit	REFER to Section 414-00 .
P0625	Generator Field Terminal Circuit Low	REFER to Section 414-00 .
P0626	Generator Field Terminal Circuit High	REFER to Section 414-00 .
P0645	A/C Clutch Relay Control Circuit	REFER to Section 412-00A or Section 412-00B .
P0657	Actuator Supply Voltage A Circuit/Open	REFER to Section 307-01 .
P065B	Generator Control Circuit Range/Performance	REFER to Section 414-00 .
P0701	Transmission Control System Range/Performance	REFER to Section 307-01 .
P0706	Transmission Range Sensor "A" Circuit Range/Performance	REFER to Section 307-01 .
P0707	Transmission Range Sensor "A" Circuit Low	REFER to Section 307-01 .
P0708	Transmission Range Sensor "A" Circuit High	REFER to Section 307-01 .
P0710	Transmission Fluid Temperature Sensor "A" Circuit	REFER to Section 307-01 .
P0711	Transmission Fluid Temperature Sensor "A" Circuit Range/Performance	REFER to Section 307-01 .
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low	REFER to Section 307-01 .

P0713	Transmission Fluid Temperature Sensor "A" Circuit High	REFER to Section 307-01 .
P0715	Turbine/Input Shaft Speed Sensor "A" Circuit	REFER to Section 307-01 .
P0717	Turbine/Input Shaft Speed Sensor "A" Circuit No Signal	REFER to Section 307-01 .
P0718	Turbine/Input Shaft Speed Sensor "A" Circuit Intermittent	REFER to Section 307-01 .
P0720	Output Shaft Speed Sensor Circuit	REFER to Section 307-01 .
P0721	Output Shaft Speed Sensor Circuit Range/Performance	REFER to Section 307-01 .
P0722	Output Shaft Speed Sensor Circuit No Signal	REFER to Section 307-01 .
P0729	Gear 6 Incorrect Ratio	REFER to Section 307-01 .
P0731	Gear 1 Incorrect Ratio	REFER to Section 307-01 .
P0732	Gear 2 Incorrect Ratio	REFER to Section 307-01 .
P0733	Gear 3 Incorrect Ratio	REFER to Section 307-01 .
P0734	Gear 4 Incorrect Ratio	REFER to Section 307-01 .
P0735	Gear 5 Incorrect Ratio	REFER to Section 307-01 .
P0740	Torque Converter Clutch Solenoid Circuit/Open	REFER to Section 307-01 .
P0741	Torque Converter Clutch Solenoid Circuit Performance/Stuck Off	REFER to Section 307-01 .
P0742	Torque Converter Clutch Solenoid Circuit Stuck On	REFER to Section 307-01 .
P0743	Torque Converter Clutch Solenoid Circuit Electrical	REFER to Section 307-01 .
P0744	Torque Converter Clutch Solenoid Circuit Intermittent	REFER to Section 307-01 .
P0748	Pressure Control Solenoid "A" Electrical	REFER to Section 307-01 .
P0750	Shift Solenoid "A"	REFER to Section 307-01 .
P0751	Shift Solenoid "A" Performance/Stuck Off	REFER to Section 307-01 .
P0752	Shift Solenoid "A" Stuck On	REFER to Section 307-01 .
P0753	Shift Solenoid "A" Electrical	REFER to Section 307-01 .
P0754	Shift Solenoid "A" Intermittent	REFER to Section 307-01 .
P0755	Shift Solenoid "B"	REFER to Section 307-01 .
P0756	Shift Solenoid "B" Performance/Stuck Off	REFER to Section 307-01 .
P0757	Shift Solenoid "B" Stuck On	REFER to Section 307-01 .
P0758	Shift Solenoid "B" Electrical	REFER to Section 307-01 .
P0759	Shift Solenoid "B" Intermittent	REFER to Section 307-01 .
P0760	Shift Solenoid "C"	REFER to Section 307-01 .
P0761	Shift Solenoid "C" Performance/Stuck Off	REFER to Section 307-01 .
P0762	Shift Solenoid "C" Stuck On	REFER to Section 307-01 .
P0763	Shift Solenoid "C" Electrical	REFER to Section 307-01 .
P0764	Shift Solenoid "C" Intermittent	REFER to Section 307-01 .
P0765	Shift Solenoid "D"	REFER to Section 307-01 .
P0766	Shift Solenoid "D" Performance/Stuck Off	REFER to Section 307-01 .
P0767	Shift Solenoid "D" Stuck On	REFER to Section 307-01 .

P0768	Shift Solenoid "D" Electrical	REFER to Section 307-01 .
P0769	Shift Solenoid "D" Intermittent	REFER to Section 307-01 .
P0770	Shift Solenoid "E"	REFER to Section 307-01 .
P0771	Shift Solenoid "E" Performance/Stuck Off	REFER to Section 307-01 .
P0772	Shift Solenoid "E" Stuck On	REFER to Section 307-01 .
P0773	Shift Solenoid "E" Electrical	REFER to Section 307-01 .
P0774	Shift Solenoid "E" Intermittent	REFER to Section 307-01 .
P07A5	Transmission Friction Element "B" Stuck On	REFER to Section 307-01 .
P07A8	Transmission Friction Element "D" Performance/Stuck Off	REFER to Section 307-01 .
P07A9	Transmission Friction Element "D" Stuck On	REFER to Section 307-01 .
P07AA	Transmission Friction Element "E" Performance/Stuck Off	REFER to Section 307-01 .
P0867	Transmission Fluid Pressure	REFER to Section 307-01 .
P0960	Pressure Control Solenoid A Control Circuit/Open	REFER to Section 307-01 .
P0961	Pressure Control Solenoid "A" Control Circuit Range/Performance	REFER to Section 307-01 .
P0962	Pressure Control Solenoid "A" Control Circuit Low	REFER to Section 307-01 .
P0963	Pressure Control Solenoid "A" Control Circuit High	REFER to Section 307-01 .
P0973	Shift Solenoid "A" Control Circuit Low	REFER to Section 307-01 .
P0974	Shift Solenoid "A" Control Circuit High	REFER to Section 307-01 .
P0976	Shift Solenoid "B" Control Circuit Low	REFER to Section 307-01 .
P0977	Shift Solenoid "B" Control Circuit High	REFER to Section 307-01 .
P0979	Shift Solenoid "C" Control Circuit Low	REFER to Section 307-01 .
P0980	Shift Solenoid "C" Control Circuit High	REFER to Section 307-01 .
P0982	Shift Solenoid "D" Control Circuit Low	REFER to Section 307-01 .
P0983	Shift Solenoid "D" Control Circuit High	REFER to Section 307-01 .
P0984	Shift Solenoid "E" Control Circuit Range/Performance	REFER to Section 307-01 .
P1285	Cylinder Head Overtemperature Condition	REFER to Section 303-03 .
P1299	Cylinder Head Overtemperature Protection Active	REFER to Section 303-03 .
P1572	Brake Pedal Switch Circuit	REFER to Section 419-03 .
P1464	A/C Demand Out Of Self Test Range	REFER to Section 412-00A or Section 412-00B .
P1635	Tire/Axle Out of Acceptable Range	REFER to Section 418-01 .
P1636	Inductive Signature Chip Communication Error	REFER to Section 307-01 .
P1639	Vehicle ID Block Corrupted, Not Programmed	REFER to Section 418-01 .
P163E	Transmission Control Module Programming Error	REFER to Section 307-01 .
P163F	Transmission ID Block Corrupted, Not Programmed	REFER to Section 307-01 .
P1702	Transmission Range Sensor Circuit Intermittent	REFER to Section 307-01 .
P1703	Brake Switch Out Of Self Test Range	REFER to Section 419-03 .
P1705	Transmission Range Circuit Not Indicating	REFER to Section 307-01 .

	Park/Neutral During Self Test	
P1711	Transmission Fluid Temperature Sensor Out Of Self Test Range	REFER to Section 307-01 .
P1714	Shift Solenoid "A" Inductive Signature	REFER to Section 307-01 .
P1744	Torque Converter Clutch Solenoid Circuit Performance	REFER to Section 307-01 .
P1780	Transmission Control Switch (O/D Cancel) Circuit Out Of Self Test Range	REFER to Section 307-01 .
P1783	Transmission Overtemperature Condition	REFER to Section 307-01 .
P1910	Reverse Lamp Control Circuit/Open	REFER to Section 307-01 .
P2700	Transmission Friction Element "A" Apply Time Range/Performance	REFER to Section 307-01 .
P2701	Transmission Friction Element "B" Apply Time Range/Performance	REFER to Section 307-01 .
P2702	Transmission Friction Element "C" Apply Time Range/Performance	REFER to Section 307-01 .
P2703	Transmission Friction Element "D" Apply Time Range/Performance	REFER to Section 307-01 .
P2704	Transmission Friction Element "E" Apply Time Range/Performance	REFER to Section 307-01 .
P2705	Transmission Friction Element "F" Apply Time Range/Performance	REFER to Section 307-01 .
P2760	Torque Converter Clutch Pressure Control Solenoid Intermittent	REFER to Section 307-01 .
P2783	Torque Converter Temperature Too High	REFER to Section 307-01 .
U0300	Internal Control Module Software Incompatibility	REFER to Section 418-01 .
All Other DTCs	-	REFER to Powertrain Control/Emissions Diagnosis (PC/ED) manual.

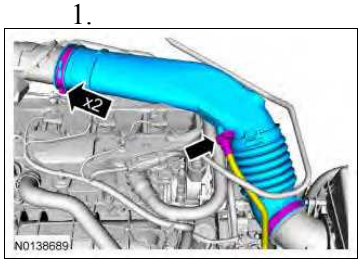
Camshaft Position (CMP) Sensor - 1.6L GTDI

Removal

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

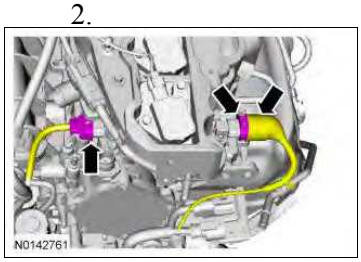
Exhaust CMP sensor

1.

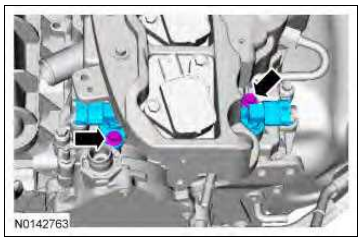


Both sensors

2.



3. • To install, tighten to 8 Nm (71 lb-in).



Installation

1. To install, reverse the removal procedure.

Camshaft Position (CMP) Sensor - 2.0L GTDI

Removal

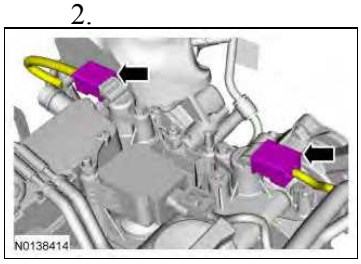
NOTE: Removal steps in this procedure may contain installation details.

LH sensor

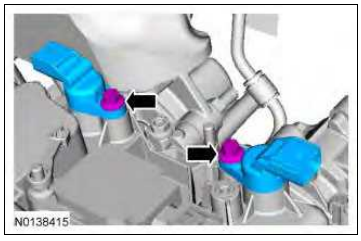
1. Remove the air cleaner outlet pipe. Refer to Section 303-12 .

Both sensors

2.



3. • To install, tighten to 6 Nm (53 lb-in).



Installation

1. To install, reverse the removal procedure.

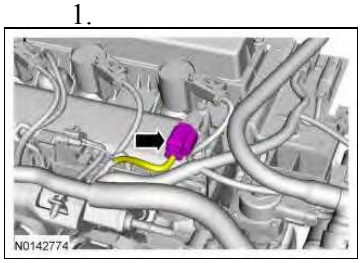
Camshaft Position (CMP) Sensor - 2.5L

Material

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

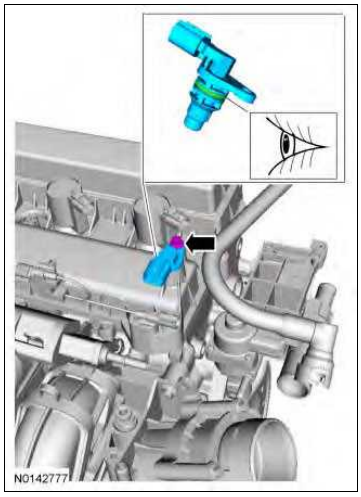
Removal and Installation

1.



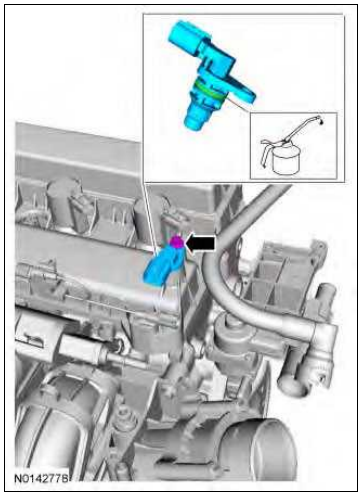
2. **NOTE:** The O-ring seals are to be reused unless damaged.

   Visual check.



Installation

1. Apply the specified lubricant to the specified component.
   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.
   - Tighten to 9 Nm (80 lb-in).



2.

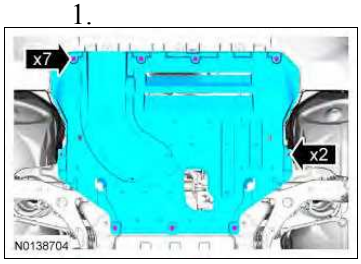
Crankshaft Position (CKP) Sensor - 1.6L GTDI

Special Tool(s)

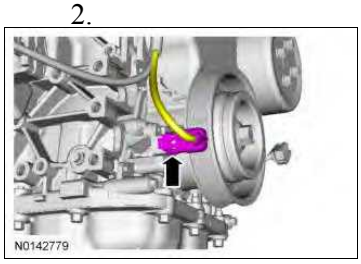
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

Removal

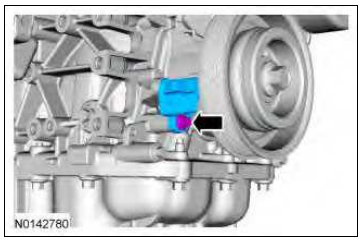
1.



2.



3. • To install, tighten to 8 Nm (71 lb-in).



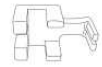
Installation

1. To install, reverse the removaocedure.

2. After completing the repairs, use the scan tool to perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.

Crankshaft Position (CKP) Sensor - 2.0L GTDI

Special Tool(s)

 ST3289-A	Crank Sensor Alignment Tool 303-1521
 ST2638-A	Timing Peg, Crankshaft TDC 303-507
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

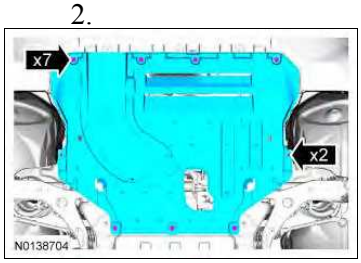
Removal

NOTICE: **Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pullolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.**

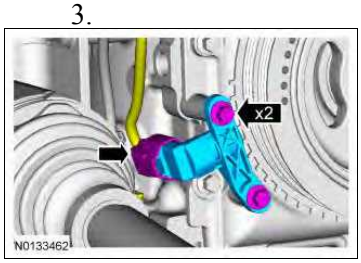
NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

1. Remove the RH fender splash shield. Refer to Section 501-02 .

2.

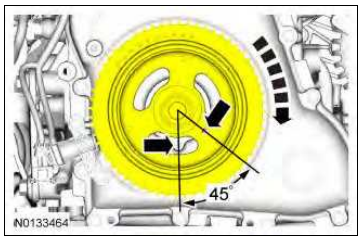


3.

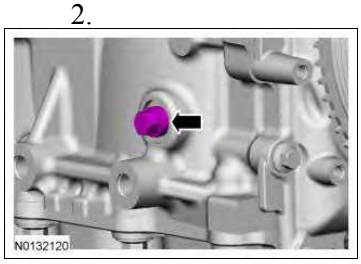


Installation

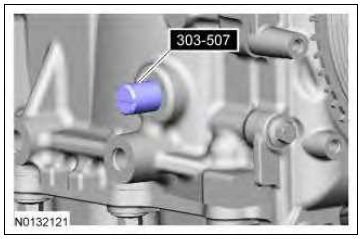
1. Turn the crankshaft clockwise until the No.1 piston is 45 degrees BTDC using the guide holes on the engine front cover and the crankshaft pulley.



2.



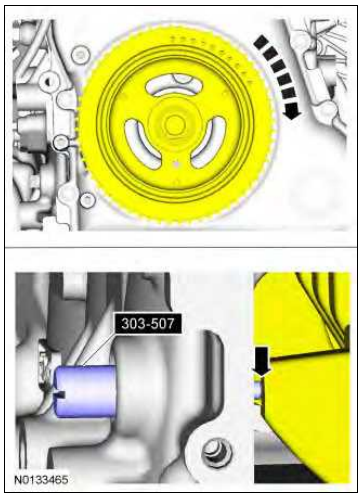
3. Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



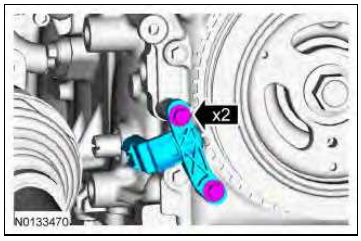
4. **NOTE:** The Crankshaft TDC Timing Peg will contact the crankshaft and prevent it from turning past TDC . However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during CKP installation.

   NOTE: The engine front cover is removed from graphic for clarity.

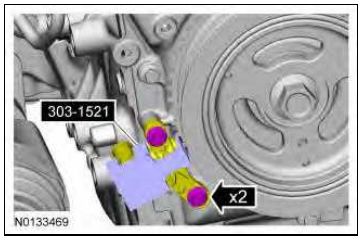
   Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



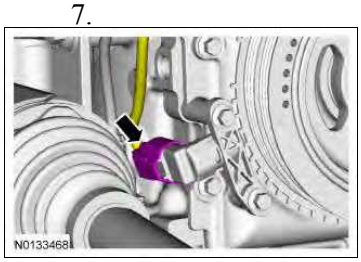
5. **NOTE:** Do not tighten the CKP sensor bolts at this time.



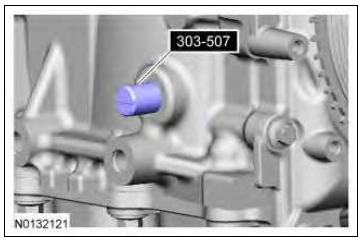
6. Special Tool(s): Crank Sensor Alignment Tool.
   Install the Crankshaft Sensor Alignment Tool onto the CKP sensor and the tooth of the crankshaft pulley trigger wheel.
   - Tighten to 7 Nm (62 lb-in).



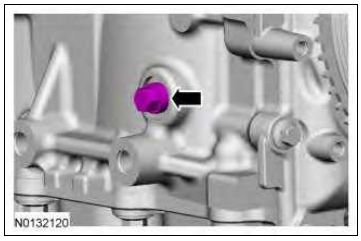
7.



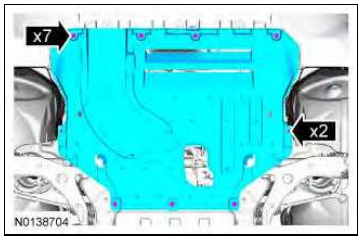
8. Remove the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



9. - Tighten to 20 Nm (177 lb-in).



10.

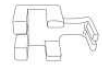


11. Install the RH fender splash shield. Refer to Section 501-02 .

12. After completing the repairs, use the scan tool to perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.

Crankshaft Position (CKP) Sensor - 2.5L

Special Tool(s)

 ST3289-A	Crank Sensor Alignment Tool 303-1521
 ST2638-A	Timing Peg, Crankshaft TDC 303-507
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

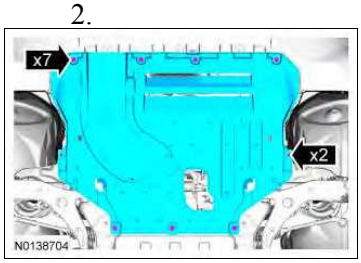
Removal

NOTICE: **Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt issened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.**

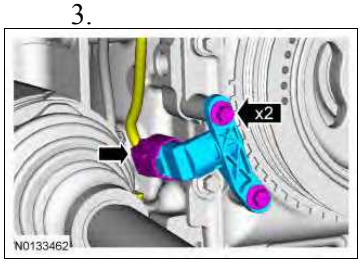
NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

1. Remove the RH fender splash shield. Refer to Section 501-02 .

2.

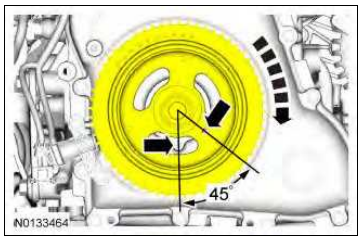


3.

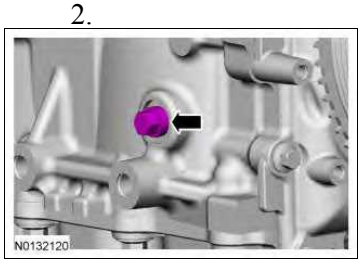


Installation

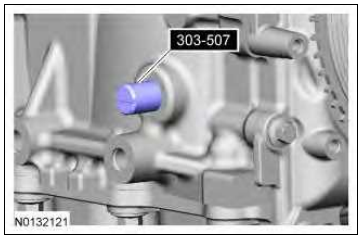
1. Turn the crankshaft clockwise until the No.1 piston is 45 degrees BTDC using the guide holes on the engine front cover and the crankshaft pulley.



2.



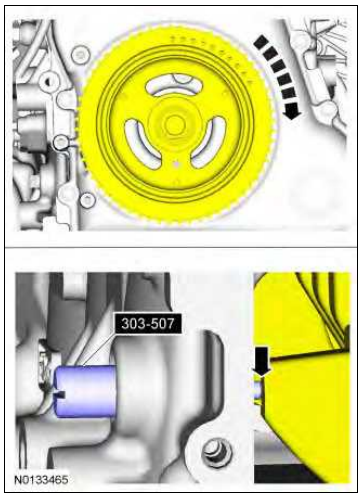
3. Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



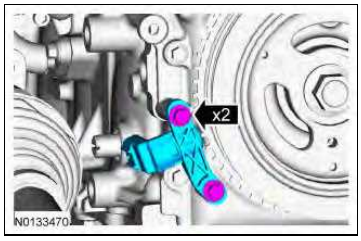
4. **NOTE:** The Crankshaft TDC Timing Peg will contact the crankshaft and prevent it from turning past TDC . However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during CKP installation.

   NOTE: The engine front cover is removed from graphic for clarity.

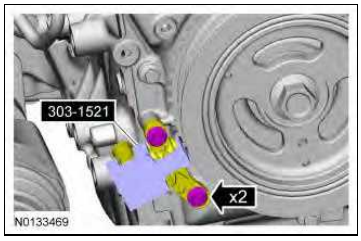
   Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



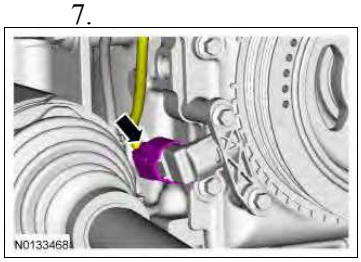
5. **NOTE:** Do not tighten the CKP sensor bolts at this time.



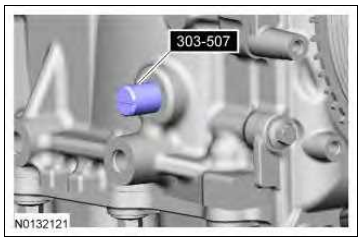
6. Special Tool(s): Crank Sensor Alignment Tool.
   Install the Crankshaft Sensor Alignment Tool onto the CKP sensor and the tooth of the crankshaft pulley trigger wheel.
   - Tighten to 7 Nm (62 lb-in).



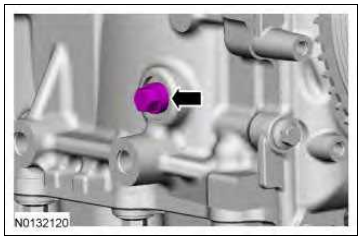
7.



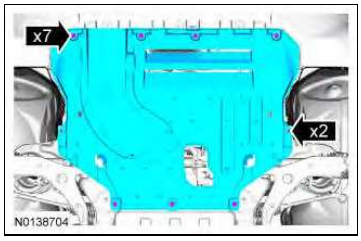
8. Remove the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



9. - Tighten to 20 Nm (177 lb-in).



10.



11. Install the RH fender splash shield. Refer to Section 501-02 .

12. After completing the repairs, use the scan tool to perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.

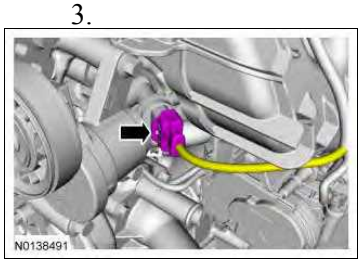
Fuel Rail Pressure (FRP) Sensor - 2.0L GTDI

Removal

1. Release the fuel system pressure. Refer to Section 310-00 .

2. Disconnect the battery ground cable. Refer to Section 414-01 .

3.



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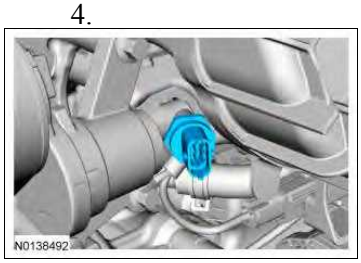
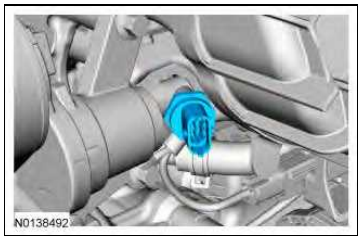
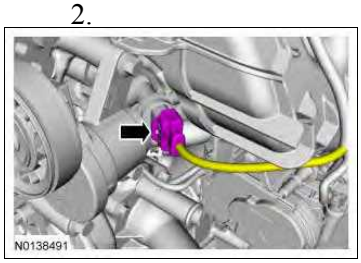


Installation

1. Tighten in 5 stages.
   - Stage 1: Tighten to 6 Nm (53 lb-in).
   - Stage 2: Tighten an additional 5 degrees.
   - Stage 3: Loosen 90 degrees.
   - Stage 4: Tighten6 Nm (53 lb-in).
   - Stage 5: Tighten an additional 21 degrees.



2.



3. Connect the battery ground cable. Refer to Section 414-01 .

Powertrain Control Module (PCM)

Special Tool(s)

 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

Removal

All engines

1. Wit the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

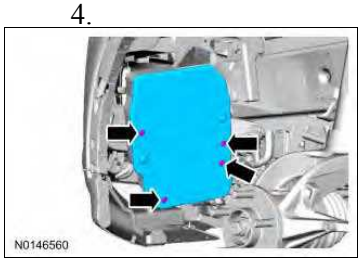
2. **NOTE:** PCM installation DOES NOT require new keys or programming of keys, only a Parameter Reset of the Passive Anti-Theft System (PATS).

   Retrieve the module configuration. Carry out the module configuration retrieval steps of the Programmable Module Installation (PMI) procedure. Refer to Section 418-01 .

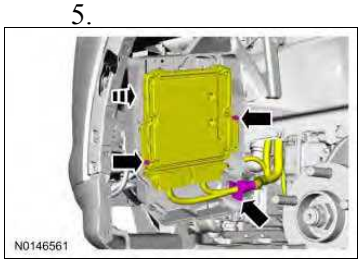
3. Remove the LH fender splash shield. Refer to Section 501-02 .

1.6L GTDI , 2.0L GTDI engines

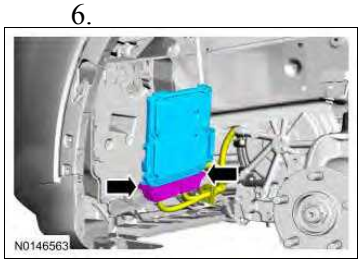
4.



5.

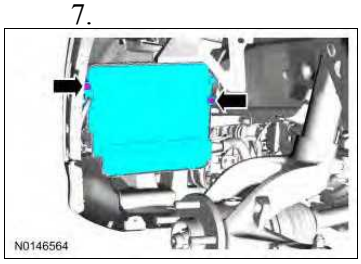


6.

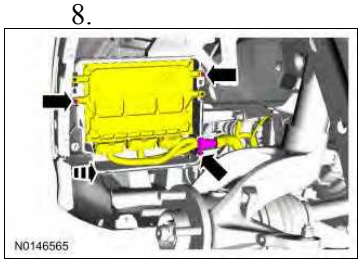


2.5L engine

7.



8.



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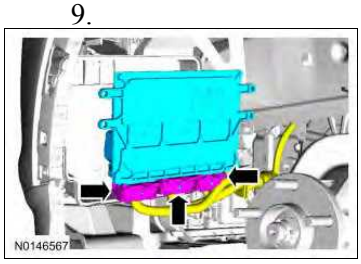
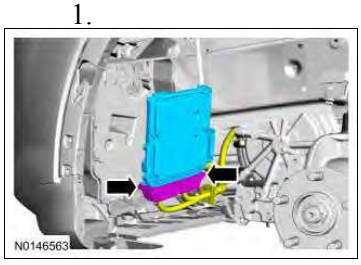


Installation

1.6L GTDI , 2.0L GTDI engines

1.



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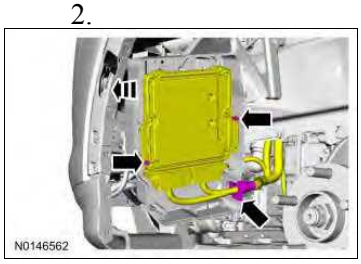
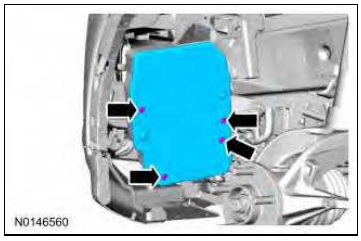
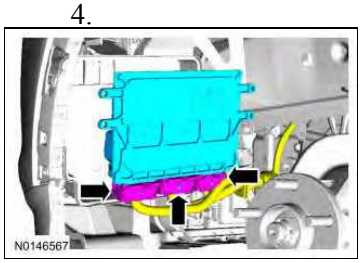


3.

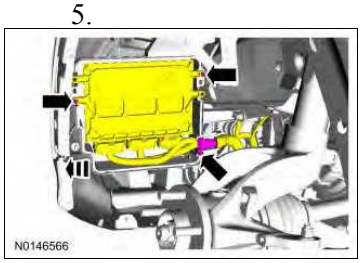


2.5L engine

4.



5.



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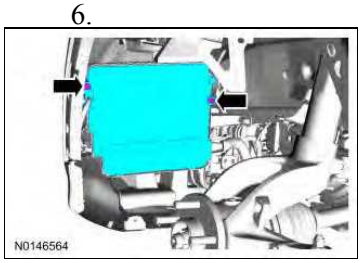


All engines

7. Install the LH fender splash shield. Refer to Section 501-02 .

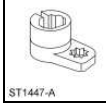
8. Restore the module configuration. Carry out the module configuration restore steps of the Programmable Module Installation (PMI) procedure. Refer to Section 418-01 .

9. Reprogram the PATS . Carry out the Parameter Reset procedure. For vehicles without IA , refer to Section 419-01B . For vehicles with IA , refer to Section 419-01C .

10. Using the scan tool, perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.

Heated Oxygen Sensor (HO2S) - 1.6L GTDI

Special Tool(s)

 ST1447-A	Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A)

Material

Item	Specification
High Temperature Nickel Anti-Seize Lubricant XL-2	-
Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada)	-

Removal

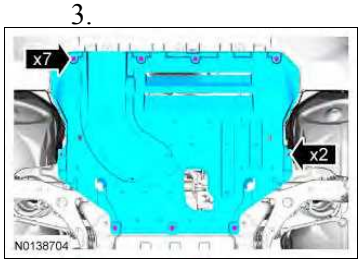
AWD vehicles

1. Remove the PTU . Refer to Section 308-07B .

FWD vehicles

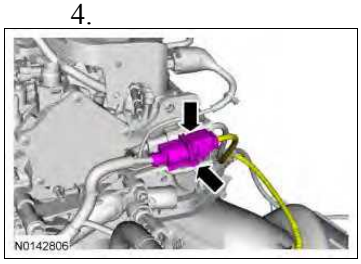
2. With the vehicleRAL, position it on a hoist. Refer to Section 100-02 .

3.



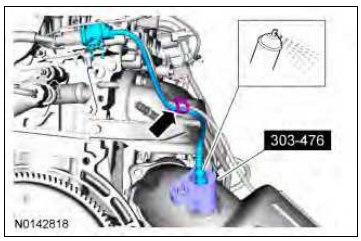
All vehicles

4.



5. Apply the specified chemical with a spray can.
   Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada).

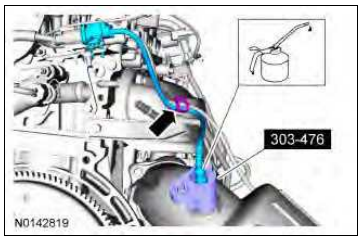
Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).



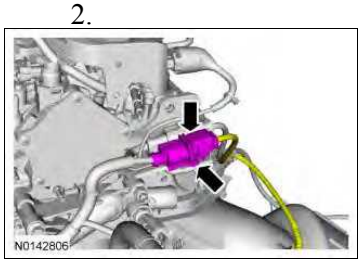
Installation

All vehicles

1. Apply the specified lubricant to the specified component.
   High Temperature Nickel Anti-Seize Lubricant XL-2.
   Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).
   - Calculate the correct torque wrench setting for the following torque. Refer to the Torque Wrench Adapter Formulas in the Appendix.
   - Tighten to 48 Nm (35 lb-ft).

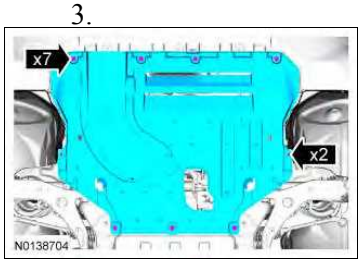


2.



FWD vehicles

3.

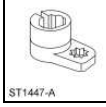


AWD vehicles

4. Install the PTU . Refer to Section 308-07B .

Heated Oxygen Sensor (HO2S) - 2.0L GTDI

Special Tool(s)

 ST1447-A	Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A)

Material

Item	Specification
High Temperature Nickel Anti-Seize Lubricant XL-2	-
Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada)	-

Removal

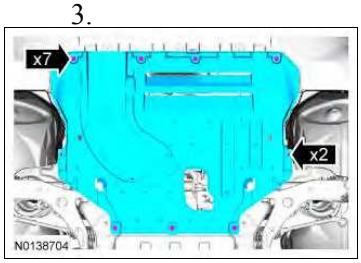
AWD vehicles

1. Remove the PTU . Refer to Section 308-07B .

FWD vehicles

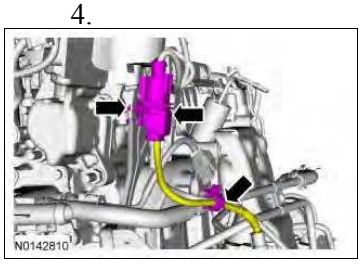
2. With the vehicleRAL, position it on a hoist. Refer to Section 100-02 .

3.



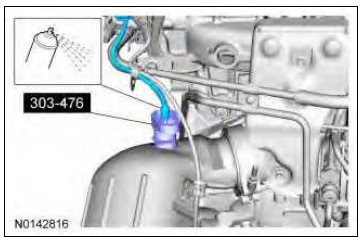
All vehicles

4.



5. Apply the specified chemical with a spray can.
   Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada).

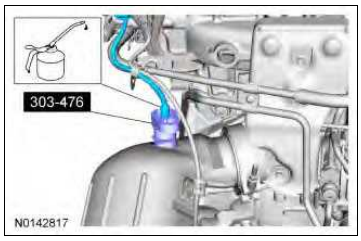
Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).



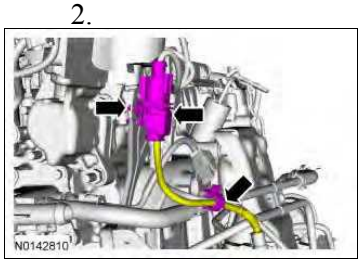
Installation

All vehicles

1. Apply the specified lubricant to the specified component.
   High Temperature Nickel Anti-Seize Lubricant XL-2.
   Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).
   - Calculate the correct torque wrench setting for the following torque. Refer to the Torque Wrench Adapter Formulas in the Appendix.
   - Tighten to 48 Nm (35 lb-ft).

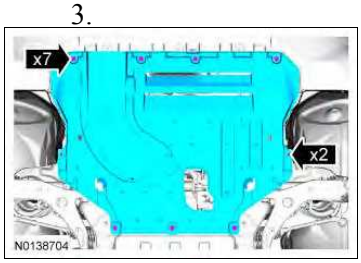


2.



FWD vehicles

3.

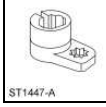


AWD vehicles

4. Install the PTU . Refer to Section 308-07B .

Heated Oxygen Sensor (HO2S) - 2.5L

Special Tool(s)

 ST1447-A	Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A)

Material

Item	Specification
High Temperature Nickel Anti-Seize Lubricant XL-2	-
Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada)	-

Removal

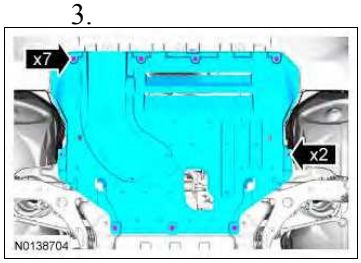
AWD vehicles

1. Remove the PTU . Refer to Section 308-07B .

FWD vehicles

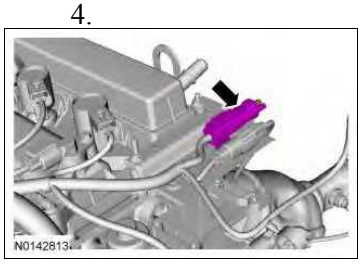
2. With the vehicle in NEUTRAion it on a hoist. Refer to Section 100-02 .

3.



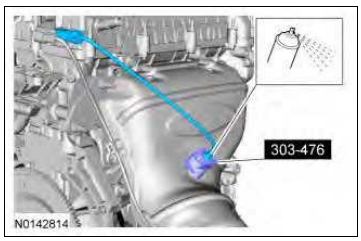
All vehicles

4.



5. Apply the specified chemical with a spray can.
   Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada).

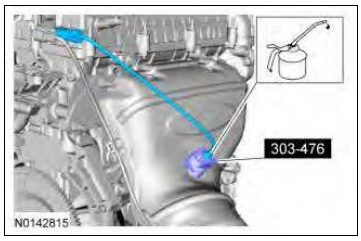
Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).



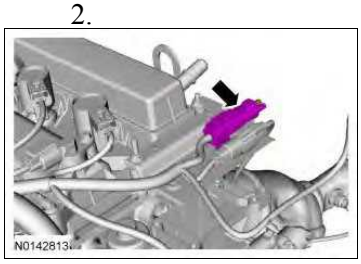
Installation

All vehicles

1. Apply the specified lubricant to the specified component.
   High Temperature Nickel Anti-Seize Lubricant XL-2.
   Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).
   - Calculate the correct torque wrench setting for the following torque. Refer to the Torque Wrench Adapter Formulas in the Appendix.
   - Tighten to 48 Nm (35 lb-ft).

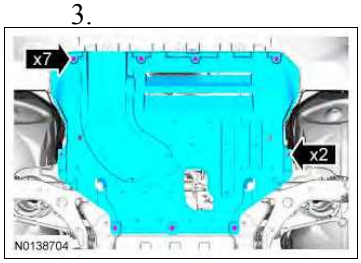


2.



FWD vehicles

3.

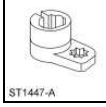


AWD vehicles

4. Install the PTU . Refer to Section 308-07B .

Catalyst Monitor Sensor - 1.6L GTDI

Special Tool(s)

 ST1447-A	Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A)

Material

Item	Specification
High Temperature Nickel Anti-Seize Lubricant XL-2	-
Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada)	-

Removal

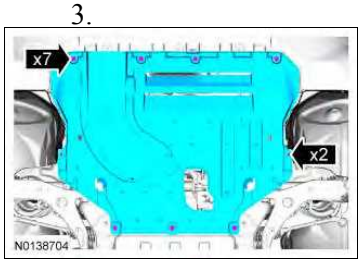
AWD vehicles

1. Remove the PTU . Refer to Section 308-07B .

FWD vehicles

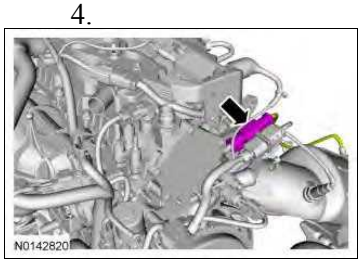
2. With the vehicle in position it on a hoist. Refer to Section 100-02 .

3.



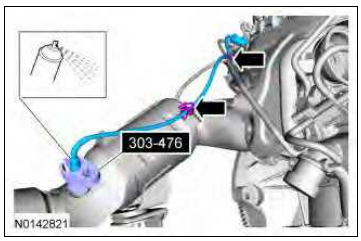
All vehicles

4.



5. Apply the specified chemical with a spray can.
   Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada).

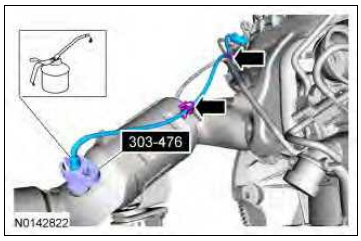
Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).



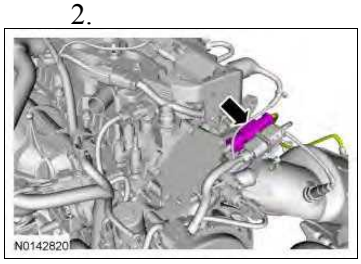
Installation

All vehicles

1. Apply the specified lubricant to the specified component.
   High Temperature Nickel Anti-Seize Lubricant XL-2.
   Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).
   - Calculate the correct torque wrench setting for the following torque. Refer to the Torque Wrench Adapter Formulas in the Appendix.
   - Tighten to 48 Nm (35 lb-ft).

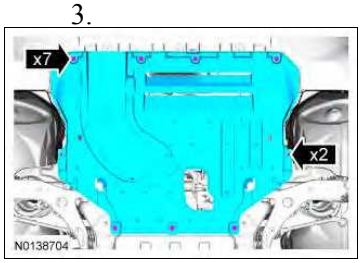


2.



FWD vehicles

3.

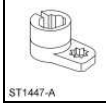


AWD vehicles

4. Install the PTU . Refer to Section 308-07B .

Catalyst Monitor Sensor - 2.0L GTDI

Special Tool(s)

 ST1447-A	Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A)

Material

Item	Specification
High Temperature Nickel Anti-Seize Lubricant XL-2	-
Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada)	-

Removal

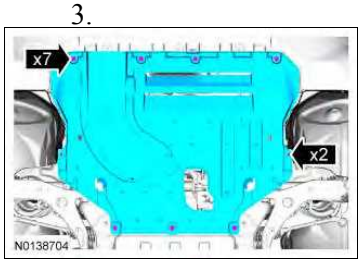
AWD vehicles

1. Remove the PTU . Refer to Section 308-07B .

FWD vehicles

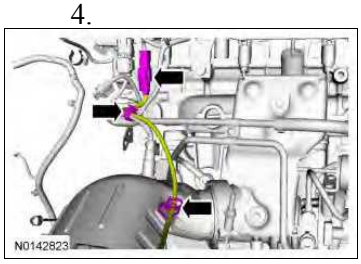
2. With the vehicle in position it on a hoist. Refer to Section 100-02 .

3.



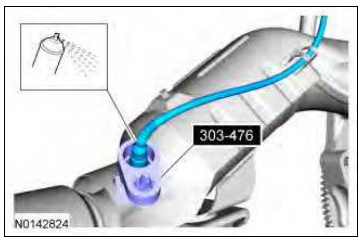
All vehicles

4.



5. Apply the specified chemical with a spray can.
   Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada).

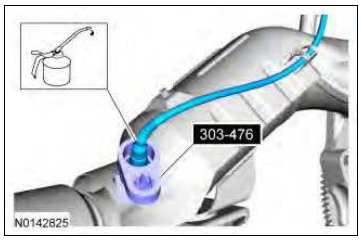
Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).



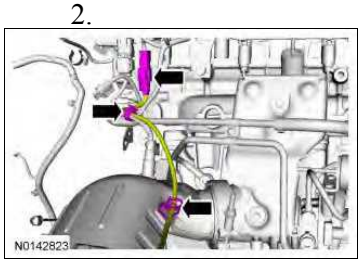
Installation

All vehicles

1. Apply the specified lubricant to the specified component.
   High Temperature Nickel Anti-Seize Lubricant XL-2.
   Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).
   - Calculate the correct torque wrench setting for the following torque. Refer to the Torque Wrench Adapter Formulas in the Appendix.
   - Tighten to 48 Nm (35 lb-ft).

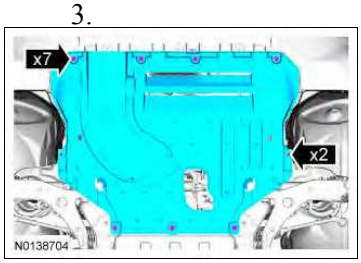


2.



FWD vehicles

3.

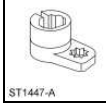


AWD vehicles

4. Install the PTU . Refer to Section 308-07B .

Catalyst Monitor Sensor - 2.5L

Special Tool(s)

 ST1447-A	Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A)

Material

Item	Specification
High Temperature Nickel Anti-Seize Lubricant XL-2	-
Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada)	-

Removal

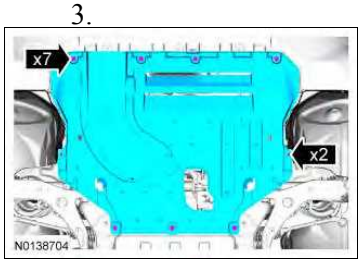
AWD vehicles

1. Remove the PTU . Refer to Section 308-07B .

FWD vehicles

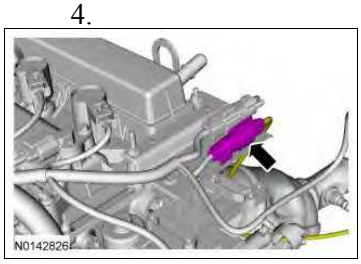
2. With the vehicle in NEUTRAL, pit on a hoist. Refer to Section 100-02 .

3.



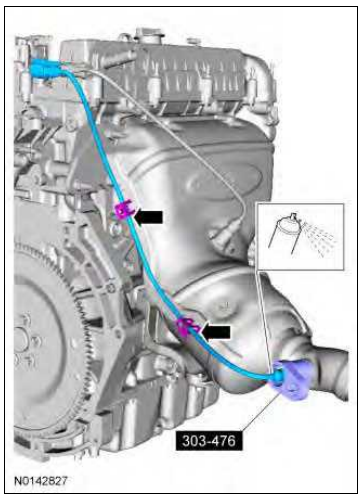
All vehicles

4.



5. Apply the specified chemical with a spray can.
   Penetrating and Lock Lubricant (US); Penetrating Fluid (Canada) XL-1 (US); CXC-51-A (Canada).

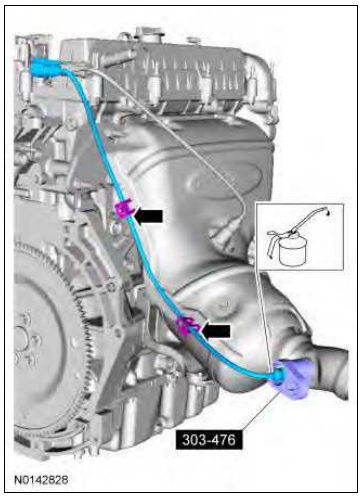
Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).



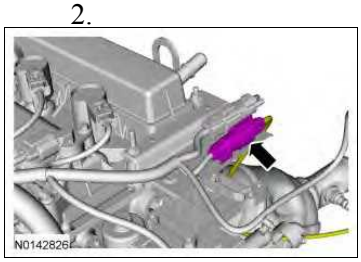
Installation

All vehicles

1. Apply the specified lubricant to the specified component.
   High Temperature Nickel Anti-Seize Lubricant XL-2.
   Special Tool(s): Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A).
   - Calculate the correct torque wrench setting for the following torque. Refer to the Torque Wrench Adapter Formulas in the Appendix.
   - Tighten to 48 Nm (35 lb-ft).

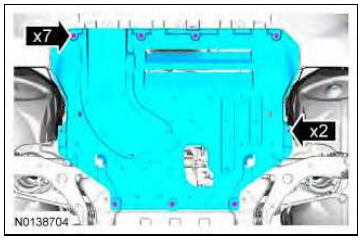


2.



FWD vehicles

3.



AWD vehicles

4. Install the PTU . Refer to Section 308-07B .

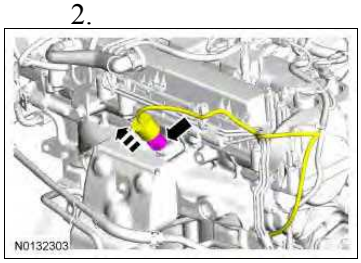
Cylinder Head Temperature (CHT) Sensor - 2.0L GTDI

Removal

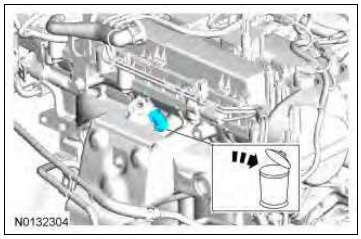
NOTE: Removal steps in this procedure may contain illustration details.

1. Remove the ACL outlet pipe and the turbocharger inlet pipe. Refer to Section 303-12 .

2.



3. Discard the specified component. Follow local disposal regulations.
   - To install, tighten to 10 Nm (89 lb-in).



Installation

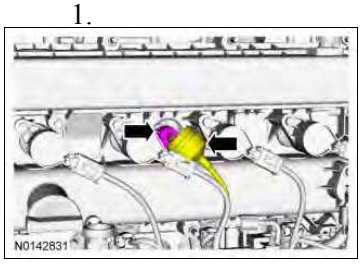
1. To install, reverse the removal procedure.
   - Install a new CHT sensor.

Cylinder Head Temperature (CHT) Sensor - 2.5L

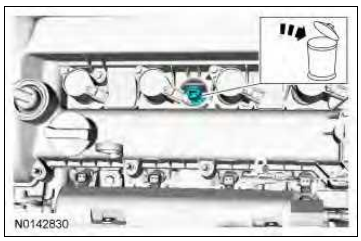
Removal

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

1.



2. Discard the specified component. Follow local disposal regulations.
   - To install, tighten to 12 Nm (106 lb-in).



Installation

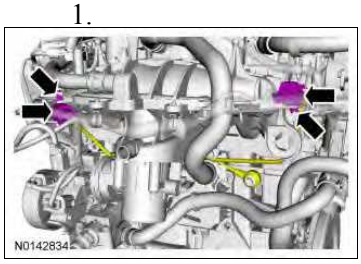
1. To install, reverse the removal procedure.
   - Install a new CHT sensor.

Knock Sensor (KS) - 1.6L GTDI

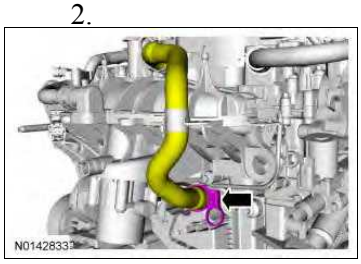
Removal

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

1.

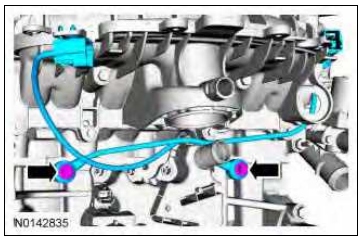


2.



3. **NOTE:** Note the position of the components before removal.

   - To install, tighten to 18 Nm (159 lb-in).



Installation

1. **NOTE:** Make sure that the component is installed to the position noted before removal.

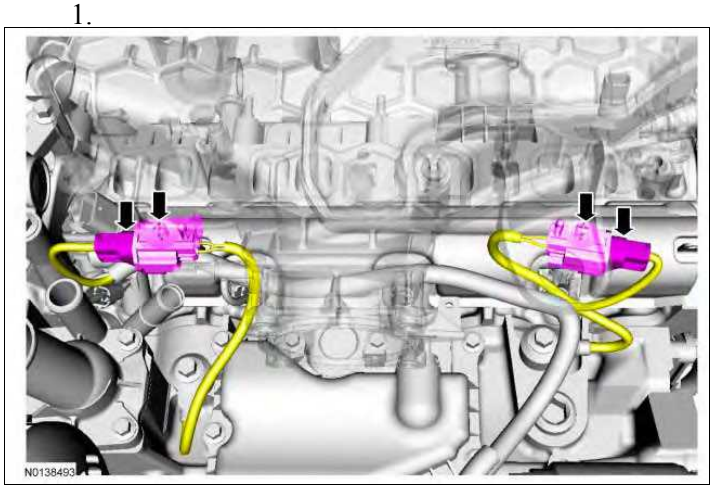
   To install, reverse the removal procedure.

Knock Sensor (KS) - 2.0L GTDI

Removal

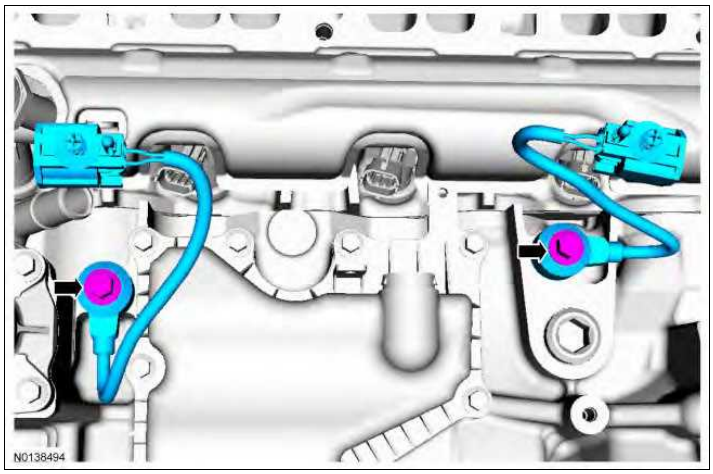
NOTE: Removal steps in this procedure may contain installation details.

1.



2. *NOTICE:* **The front KS must be installed in the 6 o'clock position and the rear KS must be installed in the 3 o'clock position. Failure to follow these instructions may damage the engine.**

   - To install, tighten to 20 Nm (177 lb-in).



Installation

1. To install, reverse the removal procedure.

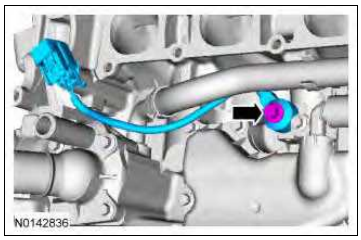
Knock Sensor (KS) - 2.5L

Removal

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

1. Remove the intake manifold. For additional information, refer to Section 303-01C .

2. • To install, tighten to 20 Nm (177 lb-in).



Installation

1. To install, reverse the removal procedure.

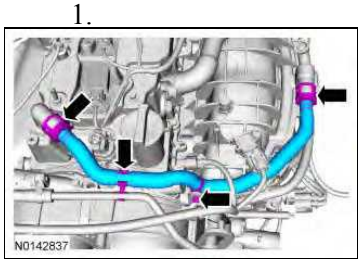
Variable Camshaft Timing (VCT) Oil Control Solenoid - 1.6L GTDI

Material

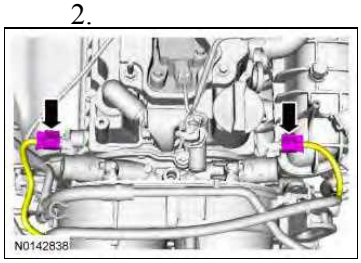
Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

1.



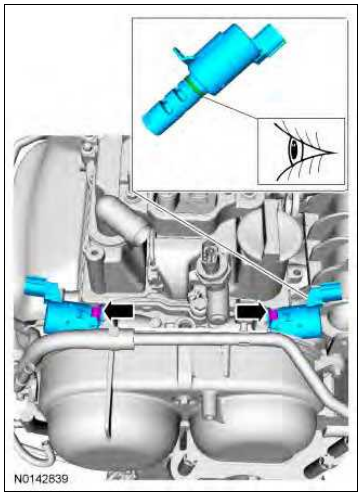
2.



3. **NOTE:** The O-ring seals are to be reused unless damaged.

   NOTE: Note the position of the components before removal.

   Visual check.

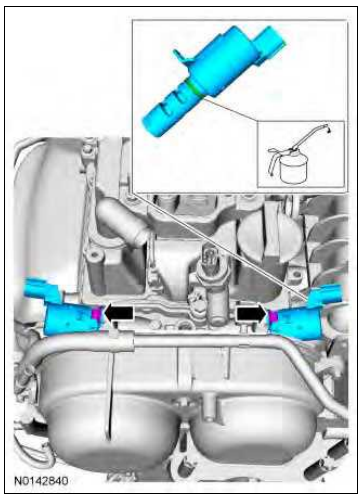


Installation

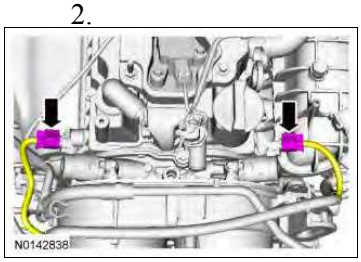
1. **NOTE:** Make sure that the component is installed to the position noted before removal.

   Apply the specified lubricant to tcified component.
   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.

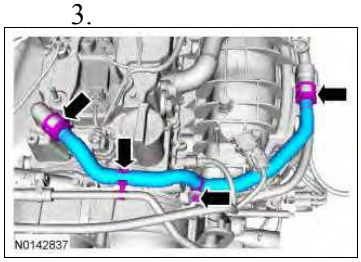
   - Tighten to 8 Nm (71 lb-in).



2.



3.



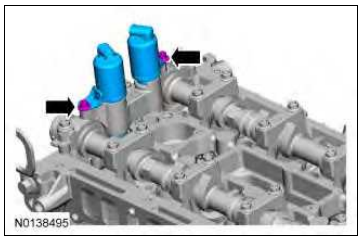
Variable Camshaft Timing (VCT) Oil Control Solenoid - 2.0L GTDI

Removal

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

1. Remove the valve cover. Refer to Section 303-01B .

2. • To install, tighten to 10 Nm (89 lb-in).



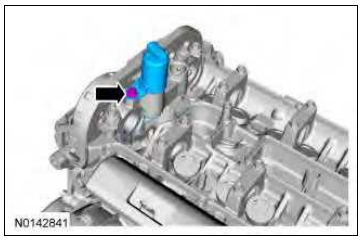
Variable Camshaft Timing (VCT) Oil Control Solenoid - 2.5L

Removal

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

1. Remove the valve cover. For additional information, refer to Section 303-01C .

2. • To install, tighten to 10 Nm (89 lb-in).



Installation

1. To install, reverse the removal procedure.

Material

Item	Specification	Fill Capacity
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A	5.4L (5.7 qt) includes filter change

General Specifications

Item	Specification		
Displacement	2.5L		
No. of cylinders	4		
Bore/stroke	89.0/100.0		
Firing order	1-3-4-2		
Oil pressure (hot @ 2,000 rpm)	200-268 kPa (29-39 psi)		
Compression ratio	9.7:1	Engine weight (without accessory drive components and flexplate)	115.8 kg (255.3 lb)
Engine and transaxle assembly weight (without accessory drive components)	203.8 kg (449.3 lb)		
Cylinder Block			
Cylinder bore diameter	89.0-89.03 mm (3.503-3.505 in)		
Cylinder bore maximum out-of-round	0.008 mm (0.0003 in)		
Main bearing bore diameter	57.018-57.040 mm (2.244-2.245 in)		
Head gasket surface flatness	0.1 mm/general 0.05 mm/200 x 200 (0.004 in/general) (0.0019 in/7.87 x 7.87)		

Piston	
Diameter (1)	88.965-88.975 mm (3.5025-3.5029 in)
Diameter (2)	88.975-88.985 mm (3.5029-3.5033 in)
Diameter (3)	88.985-88.995 mm (3.5033-3.5037 in)
Piston-to-bore clearance	0.025-0.045 mm (0.0009-0.0017 in)
Ring groove width - top	1.203-1.205 mm (0.0473-0.0474 in)
Ring groove width - 2nd	1.202-1.204 mm (0.0473-0. in)
Ring groove width - oil	2.501-2.503 mm (0.0984-0.0985 in)
Piston skirt coating thickness	0.008-0.016 mm (0.0003-0.0006 in)
Piston Pin	
Diameter	19.995-20.0 mm (0.8265-0.8267 in)
Length	54.7-55.0 mm (2.1535-2.1653 in)
Cylinder Head	
Cylinder head flatness	0.08 (0.0031 in) maximum overall, a maximum of 0.05 mm (0.0019 in) within 150 mm (5.9 in)
Valve lift @ zero lash (exhaust)	7.7 mm (0.30 in)
Valve lift @ zero lash (intake)	8.8 mm (0.35 in)
Valve guide diameter	5.509-5.539 mm (0.216-0.218 in)
Valve seat width - intake/exhaust	0.99-1.84 mm (0.038-0.072 in)
Valve seat angle	45 degrees
Valve seat runout	0.075 mm (0.0029 in)
Valve lash adjuster bore diameter	31.00-31.03 mm (1.220-1.221 in)

Cam bore diameter	25.015-25.040 mm (0.984-0.in)
Valve	
Valve head diameter - intake	34.85-35.15 mm (1.372-1.383 in)
Valve head diameter - exhaust	29.85-30.15 mm (1.175-1.187 in)
Valve stem diameter - intake	5.470-5.485 mm (0.2153-0.2159 in)
Valve stem diameter - exhaust	5.465-5.480 mm (0.2151-0.2157 in)
Valve stem-to-guide clearance - intake	0.0027 mm (0.00010 in)
Valve stem-to-guide clearance - exhaust	0.0029 mm (0.00011 in)
Valve face runout	0.05 mm (0.0019 in)
Valve face angle	45 degrees
Valve Spring - Compression Pressure	
Intake and exhaust (installed)	18 kg (39.683 lb)
Intake (valve open) 9.2 mm (0.362 in) of lift	46 kg (101.41 lb)
Exhaust (valve open) 9.2 mm (0.362 in) of lift	46 kg (101.41 lb)
Free length	47.91 mm (1.886 in)
Assembled height	37.9 mm (1.492 in)

Main bearing journal diameter	51.978-52.002 mm (2.046-2.047 in)
Production repair	51.730-51.750 mm (2.036-2.037 in)
Main bearing clearance	0.016-0.047 mm (0.0006-0.0015 in)
Connecting rod journal diameter	51.978-52.002 mm (2.046-2.047 in)
Production repair	51.730-51.750 mm (2.036-2.037 in)
End play	0.220-0.450 mm (0.008-0.018 in)
Rings	

Width - top	1.17-1.185 mm (0.0460-0.0466 in)
Width - 2nd	1.197-1.199 mm (0.0471-0.0472 in)
Width - oil	2.38-2.45 mm (0.093-0.096 in)
Ring gap (in bore) - top	0.16-0.31 mm (0.006-0.012 in)
Ring gap (in bore) - 2nd	0.31-0.46 mm (0.012-0.018 in)
Ring gap (in bore) - oil	0.2-0.7 mm (0.007-0.027 in)
Valve Tappet	
Diameter	30.97-30.98 mm>(1.2192-1.2196 in)
Tappet-to-valve clearance - intake	0.22- 0.28 mm (0.008-0.011 in)
Tappet-to-valve clearance - exhaust	0.27-0.33 mm (0.010-0.013 in)
Tappet-to-bore clearance	0.02-0.06 mm (0.0007-0.0023 in)
Camshaft	
Lobe lift - intake	9.44 mm (0.371 in)
Lobe lift - exhaust	8.18 mm (0.322 in)
Runout (1) [a]	0.03 mm (0.001 in)
Thrust clearance	0.09-0.24 mm (0.003-0.009 in)
Journal diameter	24.96-24.98 mm (0.982-0.983 in)
Journal-to-bore clearance	0.035-0.080 mm (0.001-0.003 in)
Connecting Rod	
Bearing clearance	0.027-0.052 mm (0.001-0.002 in)
Bearing thickness	1.496-1.520 mm (0.058-0.059 in)
Crank bore diameter	55.023-55.047 mm

	(2.166-2.167 in)
Pin bore diameter	20.965-20.985 mm (0.825-0.826 in)
Length (center-to-center)	151.8 mm (5.976 in)
Side clearance	1.95-3.05 mm (0.076-0.120 in)
Axial clearance	0.14-0.36 mm (0.005-0.014 in)

[a] No. 3 Journal - Supported by No. 1 and No. 5 journals.

Torque Specifications

Description	Nm	lb-ft	lb-in
A/C compressor mounting bolts	25	18	-
Accessory drive belt idler pulley bolt	11	-	97
Accessory drive belt tensioner bolts	25	18	-
Balance unit bolts [a]	-	-	-
Blocker heater	40	30	-
Camshaft bearing cap bolts [a]	-	-	-
	7	-	62
Camshaft sprocket bolts [a]	-	-	-
Coil-on-plug stud bolts	8	-	71
Connecting rod cap bolts [a]	-	-	-
Coolant outlet bolts	10	-	89
Coolant pump bolts	10	-	89
Coolant pump pulley bolts	20	-	177
Crankcase vent oil separator bolts	10	-	89
Crankshaft Position (CKP) sensor bolts [a]	-	-	-
Crankshaft pulley bolt [a]	-	-	-
Crankshaft rear oil seal retainegn="top" align="center">-	-	-	
Cylinder block pipe plug	56	41	-
Cylinder head assembly plug bolt	11	-	97
Cylinder head bolts [a]	-	-	-
Cylinder Head Temperature (CHT) sensor	12	-	106
EGR tube	55	41	-
EGR valve bolts	20	-	177
Engine front cover bolts [a]	-	-	-
Engine front cover-to-oil pan bolts [a]	-	-	-
Engine mount bolts	90	66	-
Engine mount nuts	80	5er">-	
Engine mount studs	12	-	106

Engine Oil Pressure (EOP) switch	15	-	133
Engine lift eye bolts	47	35	-
Engine plug bolt	20	-	177
Engine-to-bellhousing bolts	48	35	-
Exhaust hanger bolts	25	18	-
Exhaust manifold bracket-to-cylinder block bolts	48	35	-
Exhaust manifold bracket-to-exhaust bolts	25	18	-
Exhaust manifold heat shield bolts	11	-	97
Exhaust manifold nuts	55	41	-
Exhaust manifoign="top" align="center">17	-	150	
Exhaust pipe flange nuts	48	35	-
Flexplate bolts [a]	-	-	-
Front brace bolts	20	-	177
Fuel rail stud bolts	23	17	-
Generator electrical connection nut	15	-	133
Generator mounting bolts	25	18	-
Generator mounting bracket nut and bolt	25	18	-
Generator mounting bracket stud	7	-	62
Ground cable bolts	23	17	-
Half shaft bracket bolts	48	35	
Intake manifold bolts [a]	-	-	-
Knock Sensor (KS) bolt	20	-	177
LH transaxle mount bolt	148	109	-
Main bearing beam bolts [a]	-	-	-
Oil filter adapter bolts	25	18	-
Oil filter (spin-on filter type) [b]	-	-	-
Oil pan-to-bellhousing bolts [a]	-	-	-
Oil pan bolts [a]	-	-	-
Oil pan drain plug	28	21	-
Oil pump drive chain tensioner bolt	10	-	89
	10	-	89
Oil pump bolts [a]	-	-	-
Oil pump screen and pickup tube bolts	10	-	89
Oil pump sprocket bolt	25	18	-
Oil squirters	4	-	35
Power Distribution Box (PDB) cable nut	12	-	106
Radio capacitor nut	10	-	89
Roll restrictor bolts	125	92	-
Shift cable bracket bolts	25	18	-
Spark plug	12	-	106
Starter motor bolts	35	26 -	
Starter motor bracket nuts	18	159	-
Starter motor solenoid nut	12	-	106
Starter motor ground wire nut	5	-	44

Thermostat housing bolts	10	-	89
Timing chain guide bolts	10	-	89
Timing chain tensioner bolts	10	-	89
Torque converter nuts	40	30	-
Transaxle-to-engine bolts	48	35	-
Transmission cooler tube bolts	9	-	80
Valve cover bolts [a]	-	-	-
Valve cover bracket nualign="center">9	-	80	
Variable Camshaft Timing (VCT) oil control solenoid bolt	11	-	97
VCT cylinder head plug bolt	11	-	97

[a] Refer to the procedure for this specification.

[b] Lubricate the spin-on oil filter gasket with clean engine oil. Tighten the oil filter three-fourths turn after the oil filter gasket makes contact with the oil filter adapter.

Engine

The 2.5L (153 CID) 4-cylinder engine has the following features:

- Dual overhead camshaft
- Four valves per cylinder
- Sequential Multi-Port Fuel Injection (SFI)
- Composite intake manifold
- Aluminum cylinder head
- Aluminum cylinder block
- Electronic ignition system with coil-on-plug 4 ignition coils

NOTE: For additional information, refer to the exploded views under the Engine Assembly procedure in this section.

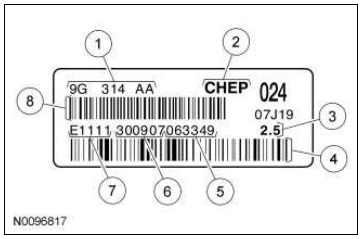
The 2.5L engine is a 4 valve-per-cylinder, dual overhead camshaft engine. The engine uses a coil-on-plug ignition system. The cylinder block is made of aluminum and the bearing caps are integrated into the ladder assembly. An aluminum oil pan bolts to the bottom of the lower cylinder block and to the transmission to provide greater strength. The camshafts are mounted in the cylinder heads and act against valve tappets to open and close the valves. The camshafts are driven off the front of the cylinder headone timing chain. The chain is driven by a sprocket that is located on the crankshaft. The piston assembly is an aluminum piston with a cast iron connecting rod. The oil pump is driven by the crankshaft via a dedicated chain that is driven by the same sprocket that drives the timing chain. The engine is at a 10 degree tilt toward the bulkhead in the vehicle.

Engine Identification

Always refer to these labels when installation of new parts is necessary or when checking engine calibrations. The engine parts often differ within a CID family. Verification of the identification codes will make sure that the correct parts are obtained. These codes contain all the pertinent information relating to the dates, optional equipment and revisions. The Ford Catalog AdvantageTM or equivalent contains a complete listing of the codes and their applications.

Engine Code Information Label

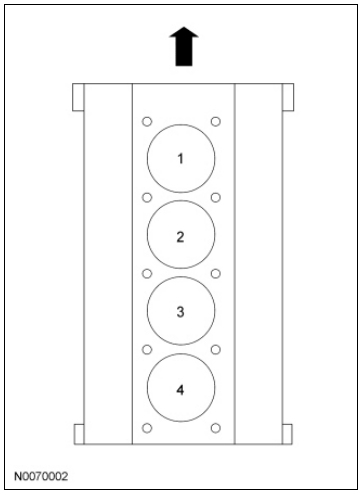
The engine code information label, located on the front side of the valve cover, contains the following:



Item	Description
1	Engine part number
2	Chihuahua engine plant

3	Engine displacement
4	Bar code
5	Running number
6	Engine build date (DDMMYY)
7	Plant shift line
8	Bar code

Engine Cylinder Identification



Lubrication System

The engine lubrication system operates as follows:

- Oil is drawn into the oil pump through the oil pump screen cover and tube in the sump of the oil pan.
- Oil is pumped through the oil filter on the left front side of the cylinder block.
- Oil enters the main gallery where it is distributed to the crankshaft main journals and to the cylinder head.
- From the main journals, the oil is routed through cross-drilled passages in the crankshaft to lubricate the connecting rod bearings. Controlled leakage through the crankshaft main bearings and connecting rod bearings is slung radially outward to cool and lubricate the cylinder walls as well as the entire connecting rod, piston and piston ring assembly.

Valve Train

The valve train uses Direct Acting Mechanical Buckets (DAMB). The camshaft lobes are positioned directly above mechanical buckets with are positioned on top of the valves.

Induction System

The iVCT system allows variable control of the intake valve closing which optimizes combustion at full load providing improved power and low speed torque (broadening the torque curve). This also enables variable valve overlap which provides better fuel economy and emissions and provides optimized cold start operation with improved exhaust emissions.

Valve Clearance Check

General Equipment

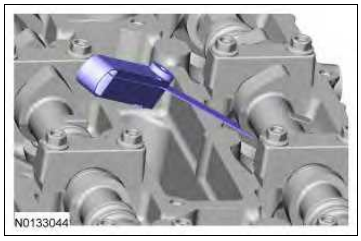
Feeler Gauge

1. Remove the valve cover. Refer to Valve Cover .

2. **NOTE:** Turn the engine clockwise only, and only use the crankshaft bolt.

   NOTE: Before removing the camshafts, measure the clearance of each valve at base circle, with the lobe pointed away from the tappet. Failure to measure all clearances prior to removing the camshafts will necessitate repeated removal and installation and wasted labor time.

   General Equipment: Feeler Gauge.
   Use a feeler gauge to measure the clearance of each valve and record its location.



3. **NOTE:** The number on the valve tappet only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

   NOTE: The nominal clearance is:

   - intake: 0.26 mm (0.01 in)
   - exhaust: 0.30 mm (0.0115 in).

   The acceptable clearances after being fully installed are:

   - intake: 0.23-0.28 mm (0.009-0.011 in).
   - exhaust: 0.27-0.33 mm (0.010-0.013 in).

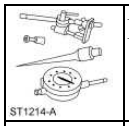
   Select tappets using this formula: tappet thickness = measured clearance + the existing tappet thickness - nominal clearance.

   Select the closest tappet size to the ideal tappet thickness available and mark the installation location.

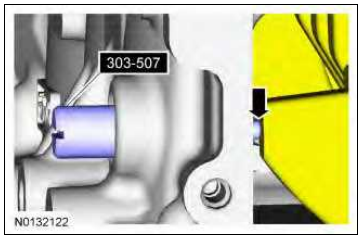
4. If any tappets do not measure within specifications, install new tappets in these locations. Refer to Valve Tappets .

Balance Shaft Backlash

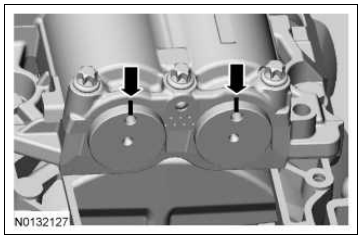
Special Tool(s)

 ST1214-A	Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C)
 ST2638-A	Timing Peg, Crankshaft TDC 303-507

1. Special tool(s): Timing Peg, Crankshaft TDC 303-507.
   Install the Crankshaft TDC Timing Peg and rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against thankshaft TDC Timing Peg. The engine is now at TDC .

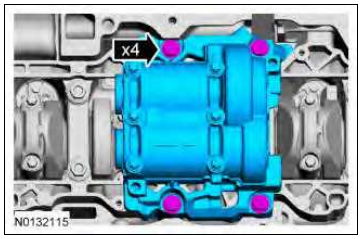


2. Mark the balancer unit and shafts on the top for reference that the balancer unit is at TDC .



3. **NOTE:** Due to the precision interior construction of the balancer unit, it should not be disassembled.

   Remove the 4 bolts and the balancer unit.

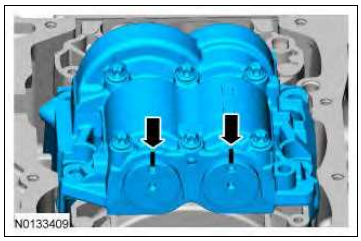


4. Remove the adjustment shims from the seat faces of the balancer unit.

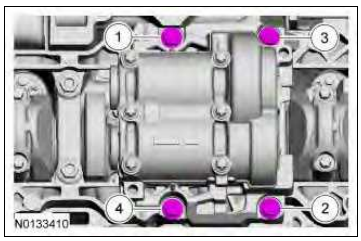
5. ***NOTICE:*** **Visually inspect the balancer unit gear for damage and verify that the shaft turns smoothly. If there is any damage or malfunction, replace the balancer unit.**

Install the master adjustment shims (No. 50) on the seat faces of the balancer unit.

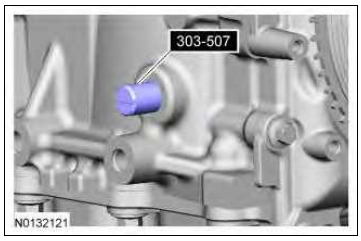
6. With the balancer unit shaft marks at the TDC position, slowly install the balancer unit to the cylinder block to avoid interference between the crankshaft drive gear and the balancer unit driven gear.



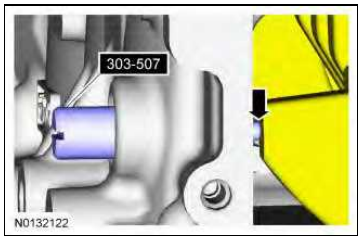
7. Install the balancer unit bolts. Tighten in the sequence shown in 2 stages.
   - Stage 1: Tighten to 25 Nm (18 lb-ft).
   - Stage 2: Tighten to 52 Nm (38 lb-ft).



8. Special tool(s): Timing Peg, Crankshaft TDC 303-507.
   Remove the Crankshaft TDC Timing Peg.
   - Rotate the crankshaft to confirm that there are no meshing problems between the balancer unit gear and the crankshaft gear.



9. Special tool(s): Timing Peg, Crankshaft TDC 303-507.
   Install the Crankshaft TDC Timing Peg and rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the Crankshaft TDC Timing Peg.
   - Remove the Crankshaft TDC Timing Peg.



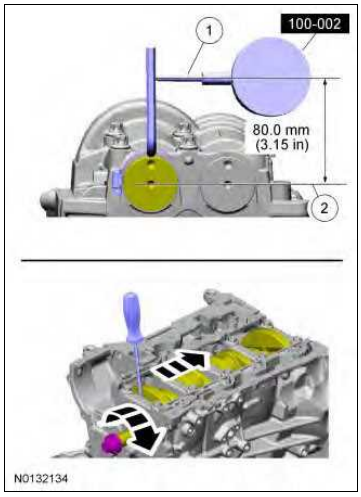
10. **NOTE:** Measure the backlash and verify that it is within specified range at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees. It will be necessary to reset the measuring equipment between measurements.

NOTE: The measurement must be taken with the Dial Indicator Gauge with Holding Fixture, a 5-mm Allen wrench and worm clamp set up as shown. Mark the Allen wrench with a file 80 mm (3.149 in) above the driven gear shaft center. Make sure the worm clamp and Allen wrench are not touching the balance shaft housing.

NOTE: For an accurate measurement while measuring the gear backlash, insert a screwdriver as shown into the crankshaft No. 1 crankweight area and set both the rotation and the thrust direction with the screwdriver, using a prying action as shown.

Special tool(s): Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C).
Position as shown. Measure the gear backlash.

- Position the Dial Indicator Gauge with Holding Fixture (1) on the Allen wrench 80 mm (3.149 in) above the driven gear shaft center (2) on the balancer unit.
- Rotate the crankshaft clockwise and measure the backlash at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees.



11. **NOTE:** If maximum backlash exceeds 0.101 mm (0.003 in), install a new balancer unit.

    Using the backlash measurement, select the proper shims from the Adjustment Shim Selection Table.

    - Remove the balancer unit from the cylinder block.
    - Install the selected adjustment shims on the seat faces of the balancer unit.

ADJUSTMENT SHIM SELECTION TABLE

Backlash mm (in)	Selection shim (No.)	Shim thicness mm (in)	Backlash mm (in)	Selection shim (No.)	Shim thicness mm (in)
0.516-0.528 (0.0203-0.0207)	15	1.15 (0.0452)	0.245-0.257 (0.0096-0.0101)	35	1.35 (0.0531)
0.502-0.514 (0.0197-0.0202)	16	1.16 (0.0456)	0.232-.0243 (0.0091-0.0095)	36	1.36 (0.535)
0.489-0.500 (0.0192-0.0196)	17	1.17 (0.0460)	0.218-0.230 (0.0085-0.0090)	37	1.37 (0.539)
0.475-0.487 (0.0187-0.0191)	18	1.18 (0.0464)	0.205-.0216 (0.0080-0.0085)	38	1.38 (0.0543)
0.462-0.473 (0.0181-0.0186)	19	1.19 (0.0468)	0.191-0.203 (0.0075-0.0079)	39	1.39 (0.0547)
0.448-0.460 (0.0176-0.0181)	20	1.20 (0.0472)	0.178-0.189 (0.0070-0.0074)	40	1.40 (0.0551)
0.435-0.446 (0.0171-0.0175)	21	1.21 (0.0476)	0.164-0.176 (0.0064-0.0069)	41	1.41 (0.0555)
0.421-0.433 (0.0165-0.0170)	22	1.22 (0.0480)	0.151-0.162 (0.0059-0.0063)	42	1.42 (0.0559)
0.408-0.419 (0.0160-0.0164)	23	1.23 (0.0484)	0.137-0.149 (0.0053-0.0058)	43	1.43 (0.0562)
0.394-0.406 (0.0155-0.0159)	24	1.24 (0.0488)	0.124-0.135 (0.0048-0.0053)	44	1.44 (0.0566)
0.381-0.392 (0.0150-0.0154)	25	1.25 (0.492)	0.110-0.122 (0.0043-0.0048)	45	1.45 (0.0570)
0.367-0.379 (0.0144-0.0149)	26	1.26 (0.0496)	0.097-0.108 (0.0038-0.0042)	46	1.46 (0.0574)
0.354-0.365 (0.0139-0.0143)	27	1.27 (0.0499)	0.083-0.095 (0.0032-0.0037)	47	1.47 (0.0578)
0.340-0.352 (0.0133-0.0138)	28	1.28 (0.0503)	0.070-0.081 (0.0027-0.0031)	48	1.48 (0.0582)
0.327-0.338 (0.0128-0.0133)	29	1.29 (0.0507)	0.056-0.068 (0.0022-0.0026)	49	1.49 (0.0586)
0.313-0.325 (0.0123-0.0127)	30	1.30 (0.0511)	0.043-0.054 (0.0016-0.0021)	50 (master)	1.50 (0.0590)
0.300-0.311 (0.0118-0.0122)	31	1.31 (0.0515)	0.029-0.041 (0.0011-0.0016)	51	1.51 (0.0594)
0.286-0.298 (0.0112-0.0117)	32	1.32 (0.0519)	0.015-0.027 (0.0005-0.0010)	52	1.52 (0.0598)
0.272-0.284 (0.0107-0.0111)	33	1.33 (0.0523)	0.002-0.014 (0.00007-0.0005)	53	1.53 (0.0602)
0.259-0.271 (0.0101-0.0106)	34	1.34 (0.0527)	0.000-0.000 (0.0000-0.0000)	54	1.54 (0.0606)

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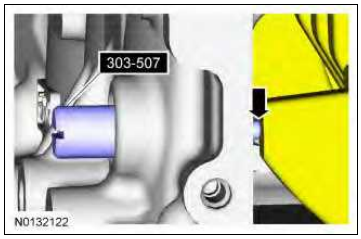
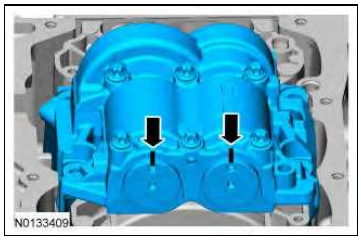
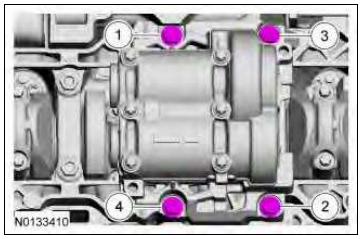
12. Special tool(s): Timing Peg, Crankshaft TDC 303-507.
    Install the Crankshaft TDC Timing Peg and rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the Crankshaft TDC Timing Peg. The engine is now at TDC .



13. With the balancer unit shaft marks in the TDC position, slowly install the balancer unit to the cylinder block to avoid interference between the crankshaft drive gear and the balancer unit driven gear.



14. Install the balancer unit bolts. Tighten in the sequence shown in 2 stages.
    - Stage 1: Tighten to 25 Nm (18 lb-ft).
    - Stage 2: Tighten to 52 Nm (38 lb-ft).



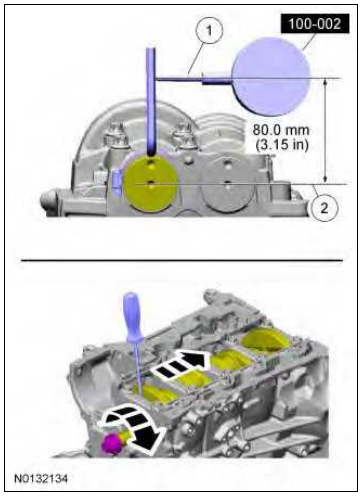
15. **NOTE:** Remeasure the backlash and verify that it is within specified range at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees. It will be necessary to reset the measuring equipment between measurements.

    NOTE: The measurement must be taken with the Dial Indicator Gauge with Holding Fixture, a 5-mm Allen wrench and worm clamp set up as shown. Mark the Allen wrench with a file 80 mm (3.149 in) above the driven gear shaft center. Make sure the worm clamp and Allen wrench are not touching the balance shaft housing.

    NOTE: For an accurate measurement while measuring the gear backlash, insert a screwdriver as shown into the crankshaft No. 1 crankweight area and set both the rotation and the thrust direction with the screwdriver, using a prying action as shown.

    Special tool(s): Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C).
    Position as shown. Measure the gear backlash.

    - Position the Dial Indicator Gauge with Holding Fixture (1) on the Allen wrench 80 mm (3.149 in) above the driven gear shaft center (2) on the balancer unit.
    - Rotate the crankshaft clockwise and measure the backlash at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees.
    - If the backlash exceeds the specified range of 0.005 to 0.101 mm (0.00019 to 0.0039 in), install a new balancer unit and repeat the procedure.



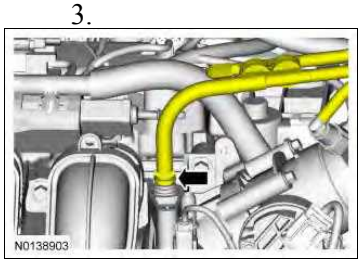
Intake Manifold

Removal

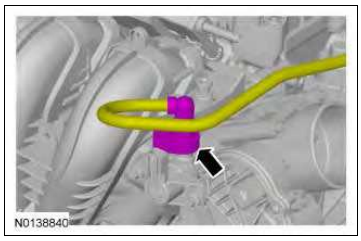
1. With vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

2. Remove the ACL outlet pipe. Refer to Section 303-12 .

3.



4. Refer to Section 310-00 .



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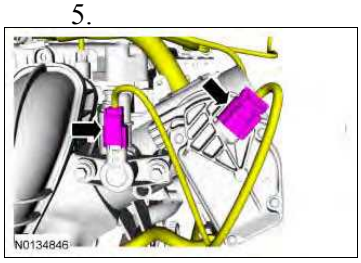

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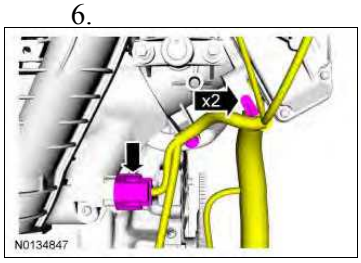

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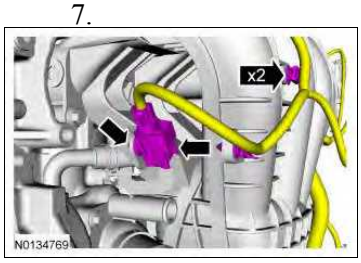

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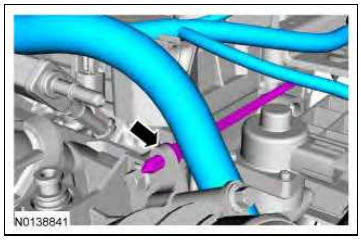

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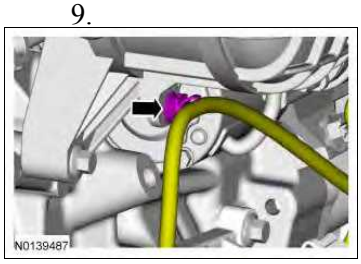

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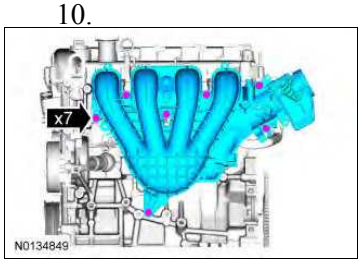

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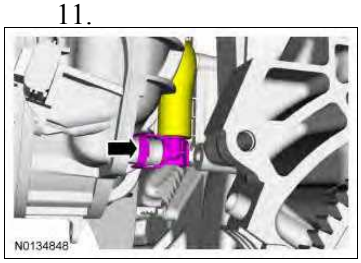
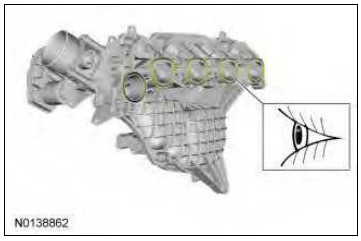


Installation

NOTICE: **If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.**

1. **NOTE:** Visually inspect the intake manifold gaskets for nicks, cuts and abrasions. If these conditions are not present, the gaskets may be re-used.

   Visual check.



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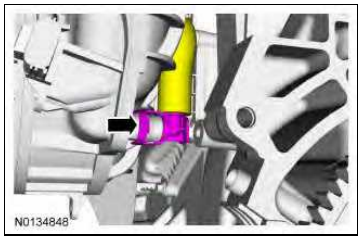
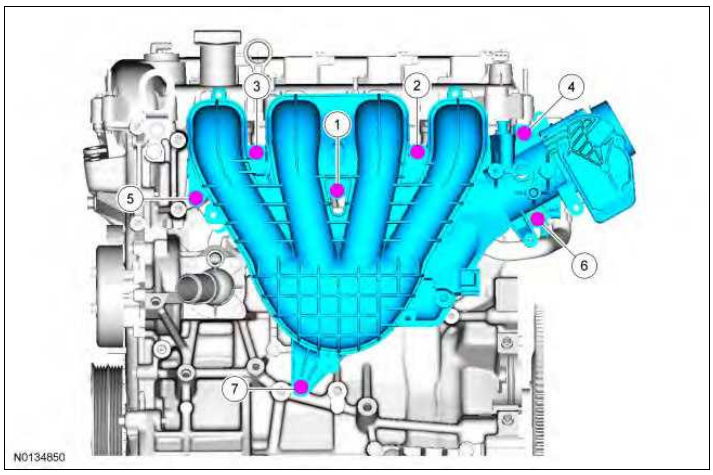


3. • Tighten to 18 Nm (159 lb-in).



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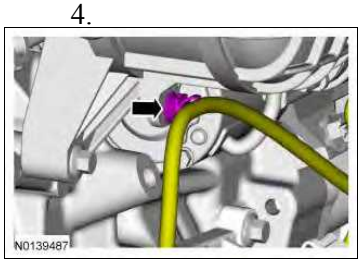

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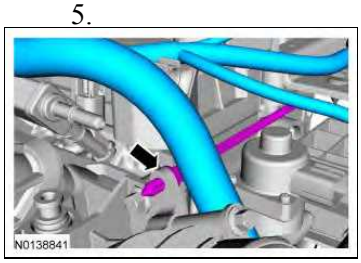

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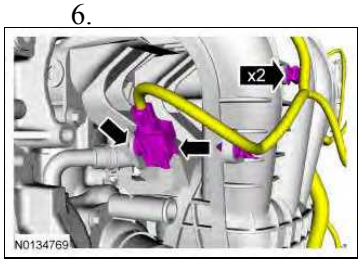

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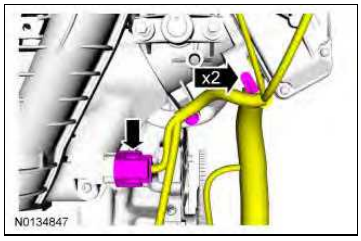

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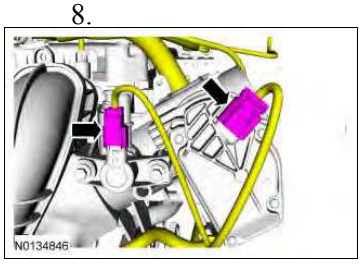
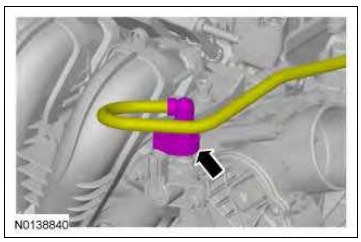


9. Refer to Section 310-00 .



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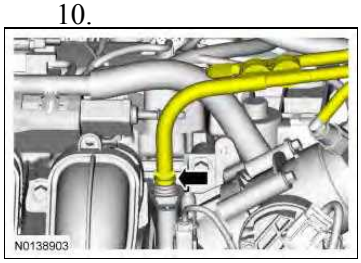


11. Install the ACL outlet pipe. Refer to Section 303-12 .

Valve Cover

Special Tool(s)

 ST1326-A	Adapter for 303-224 (Handle) 205-153 (T80T-4000-W)
 ST2983-A	Installer, VCT Spark Plug Tube Seal 303-1247/2
 ST2982-A	Remover, VCT Spark Plug Tube Seal 303-1247/1

Material

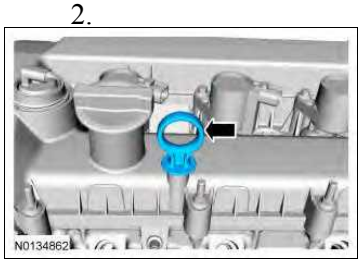
Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Removal

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

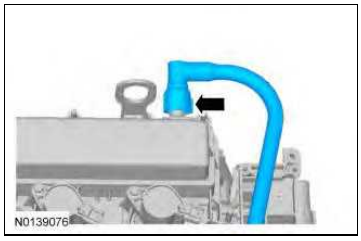
1. Remove the cowl panel. Refer to Section 501-02 .

2.



3. Remove the ignition coil-on-plugs. Refer to Section 303-07C .

4. Refer to Section 310-00



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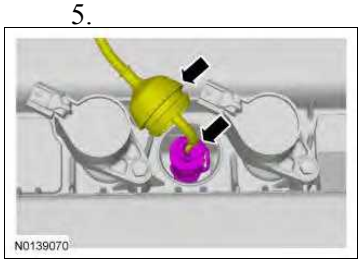

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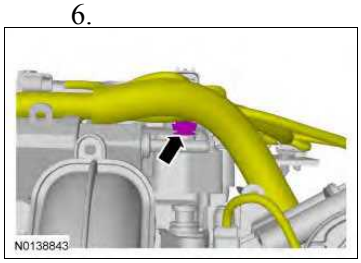

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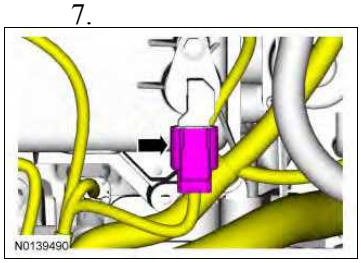

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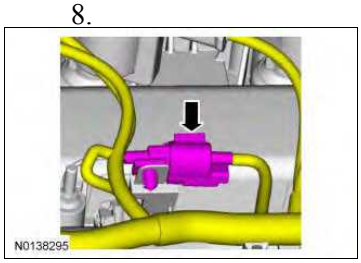

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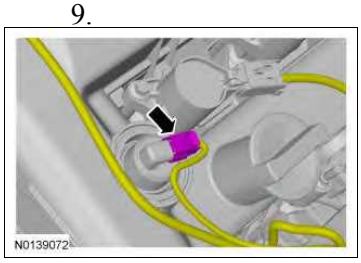

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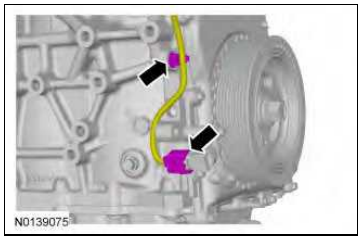

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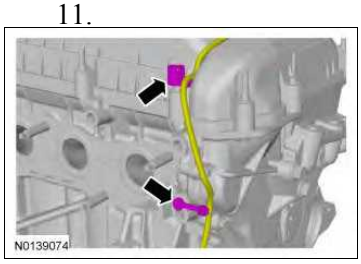

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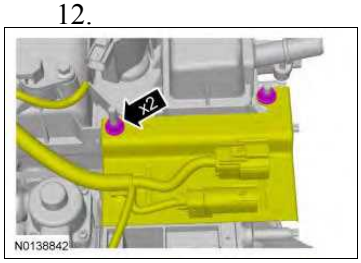

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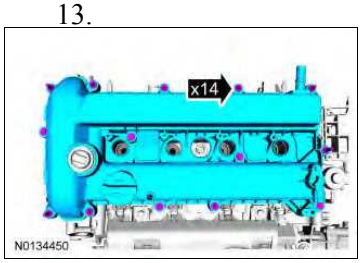
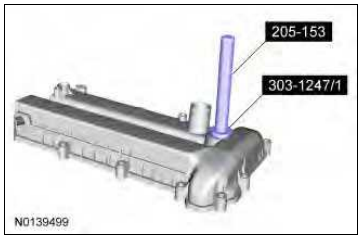


14. **NOTE:** The VCT solenoid seal should only be replaced if it is damaged.

    Special Tool(s): Remover, VCT Spark Plug Tube Seal 303-1247/1 and Adapter for 303-224 (Handle) 205-153.



15. ***NOTICE:*** **Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.**

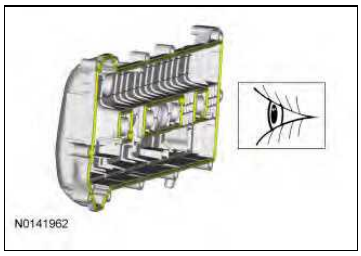
    Clean the sealing surfaces with Motorcraft® Metal Surface Prep.

Installation

1. **NOTE:** Installation of a new VCT solenoid seal is required if a damaged seal was removed during disassembly of the engine.

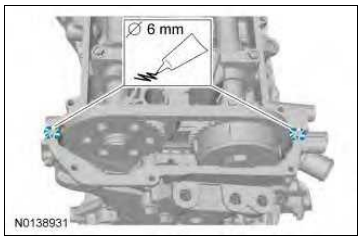
   Special Tool(s): Installer, VCT Spark Plug Tube Seal 303-1247/2 and Adapter for 303-224 (Handle) 205-153.

2. Inspect and if necessary, install new valve cover gaskets.

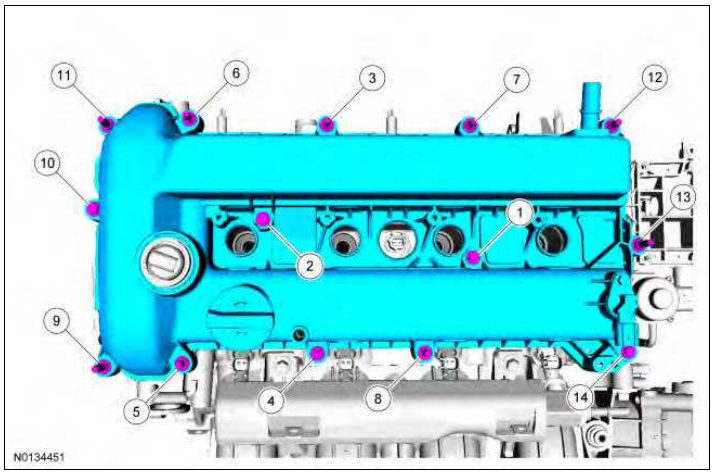


3. **NOTE:** The valve cover must be secured within 10 minutes of silicone gasket application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with metal surface prep.

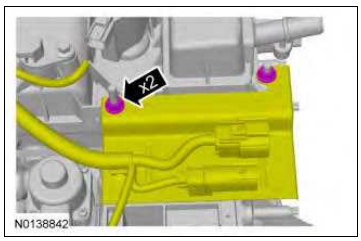
   Apply the specified sealer to the specified component.
   Material: Silicone Gasket and Sealant.



4. Tighten in the sequence shown.
   - Tighten to 10 Nm (89 lb-in).



5. • Tighten to 9 Nm (80 lb-in).



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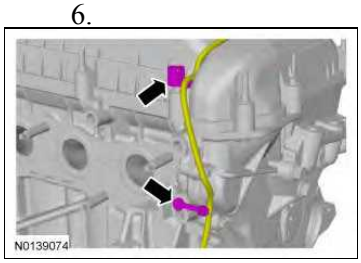

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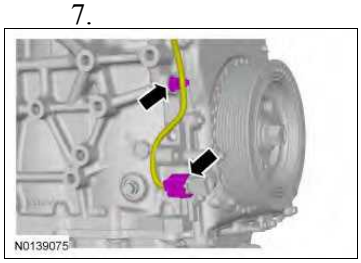

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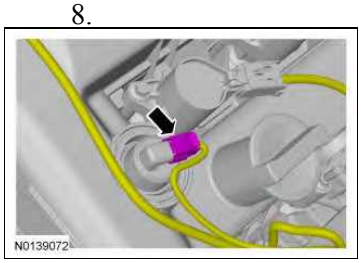

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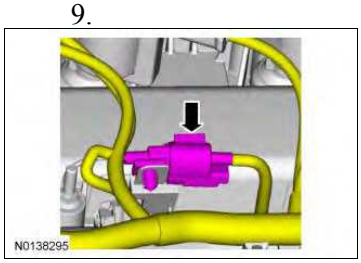

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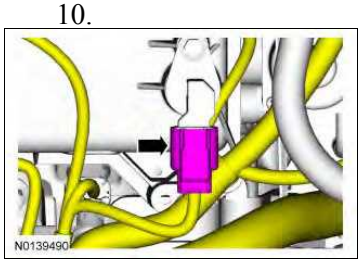

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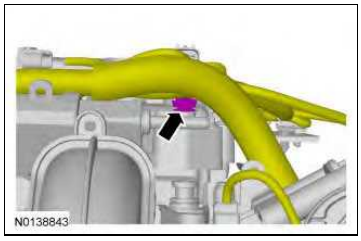

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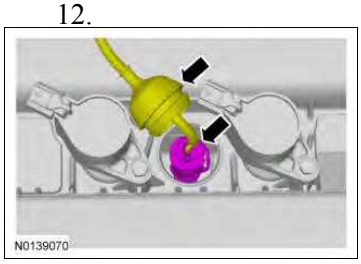
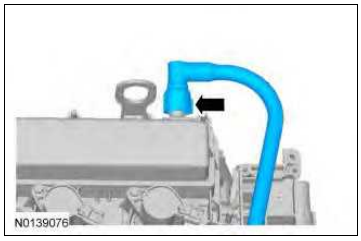
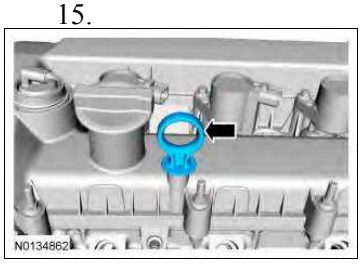


13. Refer to Section 310-00 .



14. Install the ignition coil-on-plugs. Refer to Section 303-07C .

15.



16. Install the cowl panel. Refer to Section 501-02 .

Crankshaft Pulley

Special Tool(s)

 ST2645-A	Alignment Plate, Camshaft 303-465 (T94P-6256-CH)
 ST3054-A	Holding Tool, Crankshaft Damper 303-1416
 ST2638-A	Timing Peg, Crankshaft TDC

General Equipment

6 mm x 18 mm (0.708 in) Bolt

Material

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

NOTICE: **Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.**

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

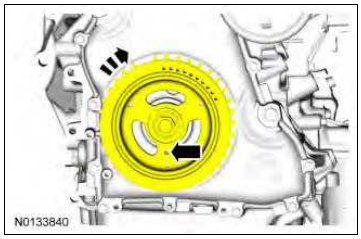
Section 204-04A .

3. Remove the right fender splash shield. Refer to Section 501-02 .

4. Remove the valve cover. Refer to Valve Cover .

5. Remove the A/C and accessory drive belts. Refer to Section 303-05 .

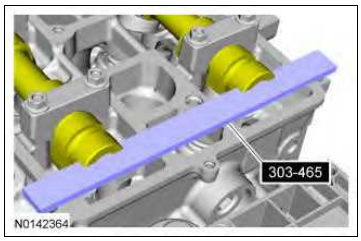
6. *NOTICE:* **Failure to position the No. 1 piston at TDC can result in damage to the engine. Turn the engine in the normal direction of rotation only.**



7. *NOTICE:* **The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.**

   NOTE: The camshaft timing slots are offset. If the Camshaft Alignment Plate cannot be installed, rotate the crankshaft one complete revolution clockwise to correctly position the camshafts.

   Special Tool(s): Alignment Plate, Camshaft 303-465.



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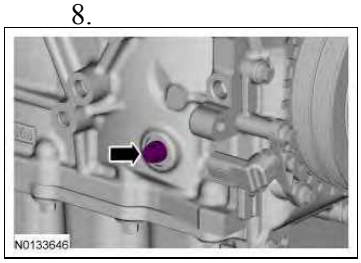
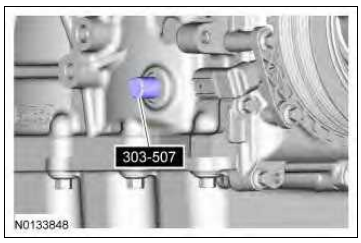


9. **NOTE:** The Crankshaft TDC Timing Peg will contact the crankshaft and prevent it from turning past TDC . However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during the crankshaft pulley removal and installation.

   Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



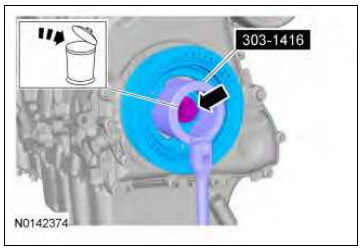
10. *NOTICE:* **The crankshaft must remain in the TDC position during removal of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the**

Crankshaft Damper Holding Tool, and the bolt should be removed using an air impact wrench (1/2-in drive minimum).

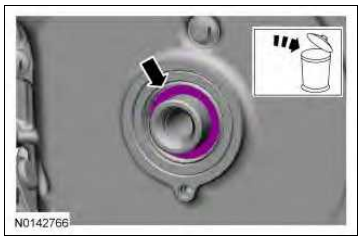
NOTICE: **The crankshaft sprocket diamond washer may come off with the crankshaft pulley. The diamond washer must be replaced. Remove and discard the diamond washer. If the diamond washer is not installed, engine damage may occur.**

NOTE: Use an air impact wrench to remove the crankshaft pulley bolt.

Special Tool(s): Holding Tool, Crankshaft Damper 303-1416.
Discard the specified component. Follow local disposal regulations.

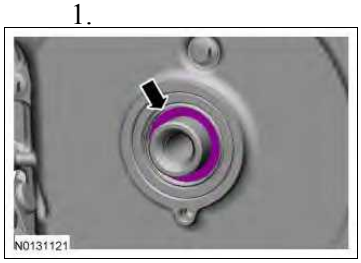


11. Discard the specified component. Follow local disposal regulations.



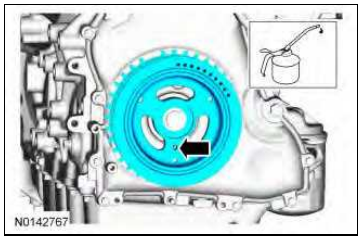
Installation

1.



2. **NOTE:** Do not install the crankshaft pulley bolt at this time.

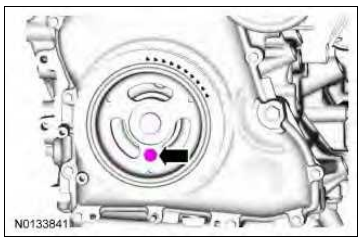
   6 o'clock position.
   Apply the specified lubricant to the specified component.
   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.



3. *NOTICE:* **Only hand-tighten the 6 mm x 18 mm bolt or damage to the front cover can occur.**

NOTE: This step will correctly align the crankshaft pulley to the crankshaft.

General Equipment: M6 Bolt.

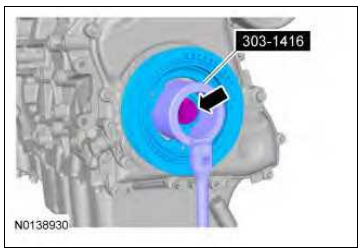


4. *NOTICE:* **The crankshaft must remain in the Top Ded Center (TDC) position during installation of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Crankshaft Damper Holding Tool and the bolt should be installed using hand tools only.**

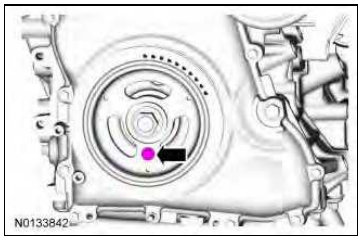
   NOTE: Install a new crankshaft pulley bolt.

   Special Tool(s): Holding Tool, Crankshaft Damper 303-1416.
   Tighten to:

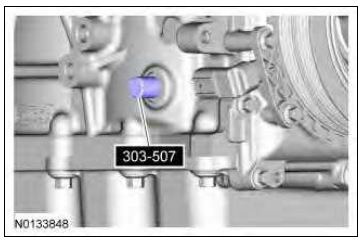
   - Stage 1: Tighten to 100 Nm (74 lb-ft).
   - Stage 2: Tighten an additional 90 degrees (1/4 turn).



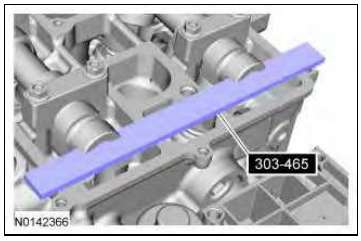
5. Remove the General Equipment: M6 Bolt.



6. Remove the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.

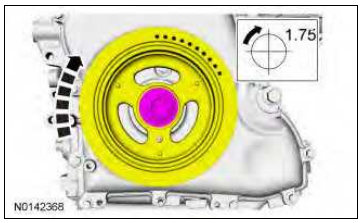


7. Remove the Special Tool(s): Alignment Plate, Camshaft 303-465.



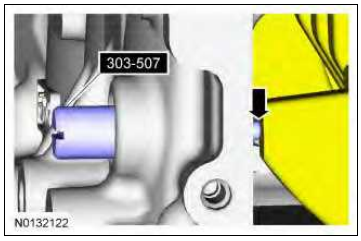
8. **NOTE:** Only turn the engine in the normal direction of rotation.

   Turn one and three-fourths turns.



9. **NOTE:** Only turn the engine in the normal direction of rotation.

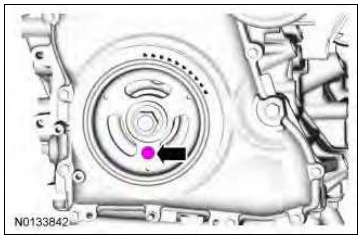
   Install the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.
   Turn the crankshaft clockwise until the crankshaft contacts the Crankshaft TDC Timing Peg.



10. ***NOTICE:*** **Only hand-tighten the bolt or damage to the front cover can occur.**

    Remove the General Equipment: M6 Bolt.

    - Check the position of the crankshaft pulley.
    - If it is not possible to install the bolt, the engine valve timing must be corrected by repeating this procedure.

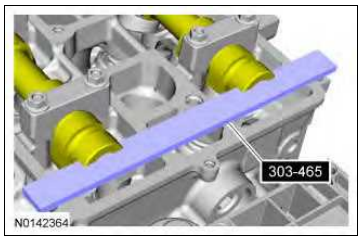


11. ***NOTICE:*** **The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.**

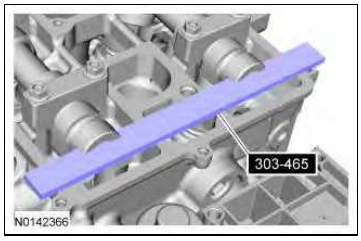
    NOTE: The camshaft timing slots are offset. If the Camshaft Alignment Plate cannot be installed, rotate the crankshaft one complete revolution clockwise to correctly position the camshafts.

    Install the Special Tool(s): Alignment Plate, Camshaft 303-465.

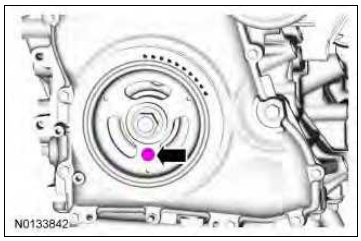
- If it is not possible to install the Camshaft Alignment Plate, the engine valve timing must be corrected.



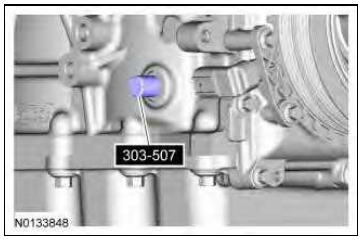
12. Remove the Special Tool(s): Alignment Plate, Camshaft 303-465.



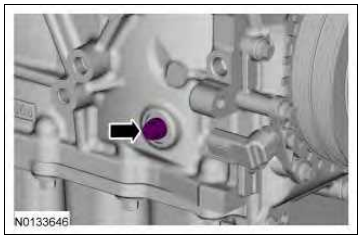
13. Remove the General Equipment: M6 Bolt.



14. Remove the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



15. - Tighten to 20 Nm (177 lb-in).



16. Install the A/C and the accessory drive belts. Refer to Section 303-05 .

17. Install the valve cover. Refer to Valve Cover .

18. Install the right fender splash shield. Refer to Section 501-02 .

19. Install the front RH wheel and tire. Refer to Section 204-04A .

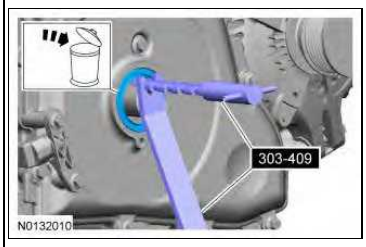
20. Using the scan tool, perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.
    Special Tool(s): Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

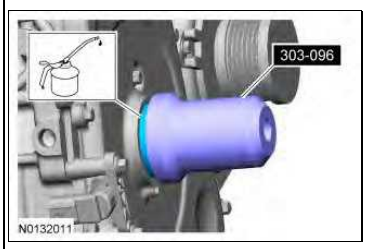
Crankshaft Front Seal

Special Tool(s)

 ST1917-A	Installer, Camshaft Front Oil Seal 303-096 (T74P-6150-A)
 ST1385-A	Remover, Oil Seal 303-409 (T92C-6700-CH)

Material

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	• Remove the crankshaft pulley. Refer to Crankshaft Pulley . 2. ***NOTICE:*** **Use care not to damage the engine front cover or the crankshaft when removing the seal.** Discard the specified component. Follow local disposal regulations. Special Tool(s): Remover, Oil Seal 303-409.  **Installation** 1. **NOTE:** Remove the through-bolt from the Camshaft Front Oil Seal Installer. Apply the specified lubricant to the specified component. Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.

	Special Tool(s): Installer, Camshaft Front Oil Seal 303-096.  2. Install the crankshaft pulley. Refer to Crankshaft Pulley .

Flexplate

Special Tool(s)

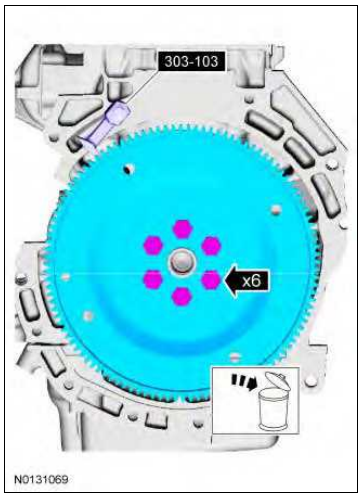
 ST2768-A	Holding Tool, Flywheel 303-103 (T74P-8375-A)

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

2. Remove the automatic transaxle. Refer to Section 307-01 .

3. Discard the specified component. Follow local disposal regulations.
   Special Tool(s): Holding Tool, Flywheel 303-103.



Installation

1. Special Tool(s): Holding Tool, Flywheel 303-103.
   - Stage 1: Tighten to 50 Nm (37 lb-ft).
   - Stage 2: Tighten to 80 Nm (59 lb-ft).
   - Stage 3: Tighten to 112 Nm (83 lb-ft).

2. Install the automatic transaxle. Refer to Section 307-01 .

3. Using the scan tool, perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.

Crankshaft Rear Seal

Special Tool(s)

 ST1506-A	Installer, Crankshaft Rear Main Oil Seal 303-328 (T88P-6701-B1)

Material

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Silicone Gasket Remover ZC-30	-

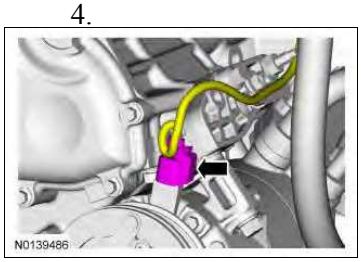
Removal

Section 100-02 .

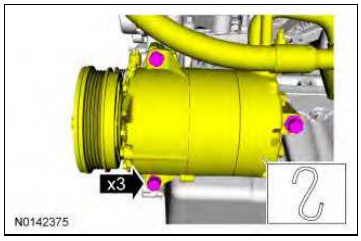
2. Remove the flexplate. Refer to Flexplate .

3. Remove the A/C belt. Refer to Section 303-05 .

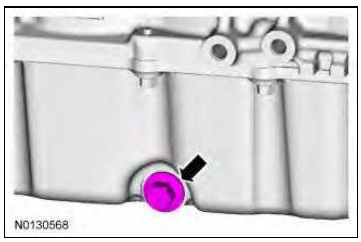
4.



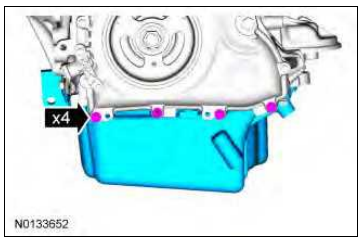
5. Relocate and support the component.



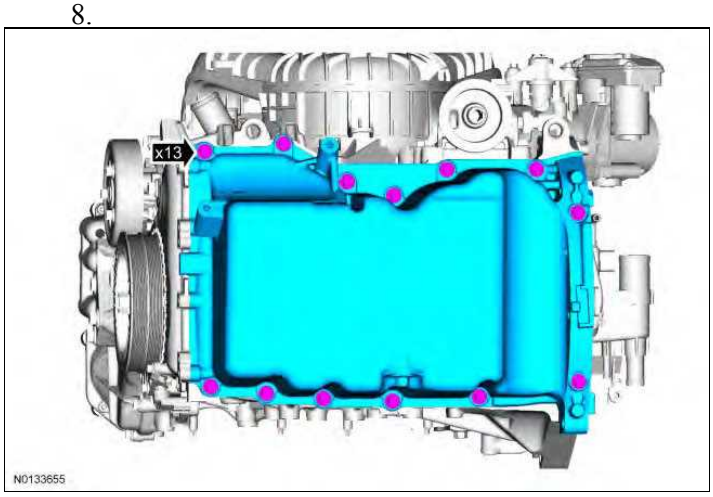
6. • To install, tighten to 28 Nm (21 lb-ft).



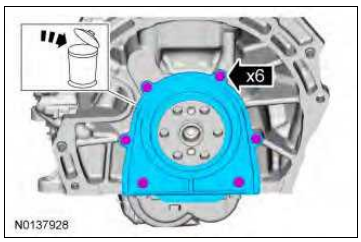
7. ***NOTICE:*** **If the oil pan is not removed, damage to the rear oil seal retainer joint may occur.**



8.



9. Discard the specified component. Follow local disposal regulations.

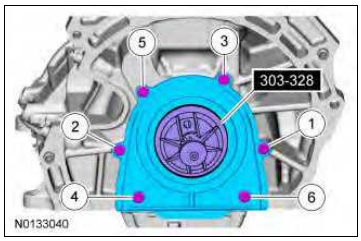


Installation

1. *NOTICE:* **Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.**

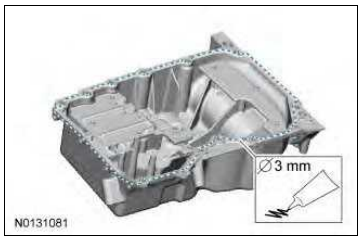
   Clean all mating surfaces with Motorcraft® Metal Surface Prep and Motorcraft® Silicone Gasket Remover.

2. Tighten in the sequence shown.
   Special Tool(s): Installer, Crankshaft Rear Main Oil Seal 303-328.
   - Tighten to 10 Nm (89 lb-in).

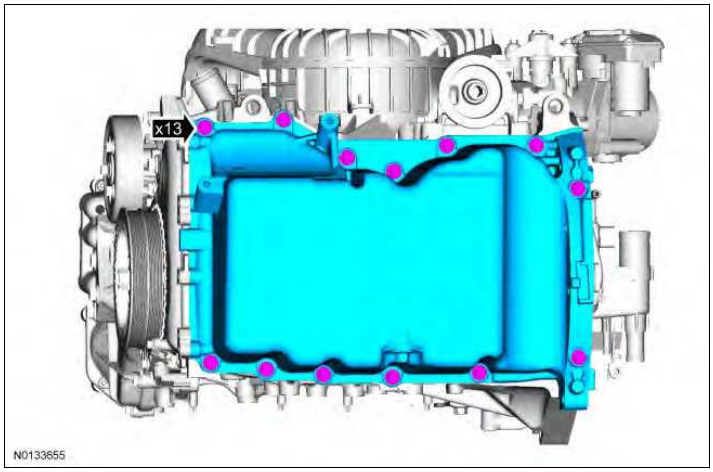


3. **NOTE:** If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned with metal surface prep. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

   Apply a continuous bead of the specified diameter from the specified tube.
   Material: Silicone Gasket and Sealant TA-30.

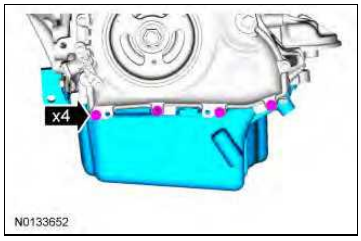


4. Tighten finger tight.

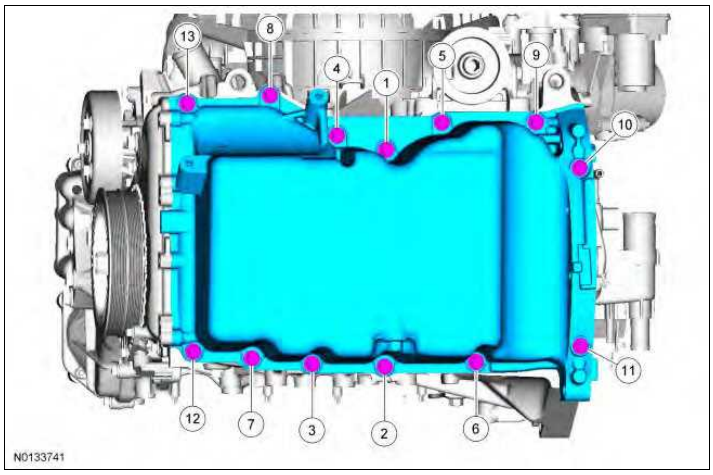


5. **NOTE:** The engine front cover-to-oil pan bolts must be tightened first to align the front surface of the oil pan ush with the front surface of the engine block.

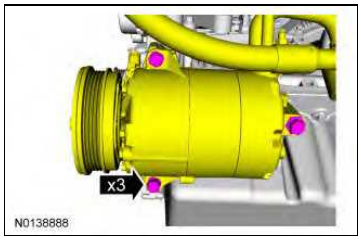
   - Tighten to 10 Nm (89 lb-in).



6. Tighten in the sequence shown.
   - Tighten to 20 Nm (177 lb-in).



7. - Tighten to 25 Nm (18 lb-ft).



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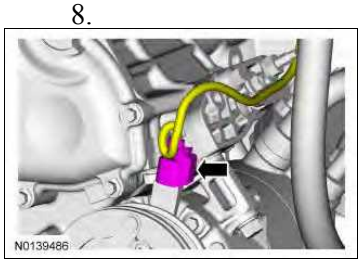


9. Install the A/C belt. Refer to Section 303-05 .

10. Install the flexplate. Refer to Flexplate .

11. Fill the engine with clean engine oil.
    Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.

Engine Front Cover

Special Tool(s)

 ST3055A	Aligner, Crankshaft Sensor 303-1417
 ST1917-A	Installer, Camshaft Front Oil Seal 303-096 (T74P-6150-A)
 ST1385-A	Remover, Oil Seal 409 (T92C-6700-CH)

General Equipment

6 mm x 18 mm bolt

Material

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Removal

NOTICE: **Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.**

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

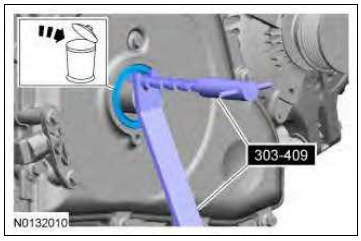
1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

2. Remove the crankshaft pulley. Refer to Crankshaft Pulley .

3. Remove the engine mount. Refer to Engine Mount .

4. ***NOTICE:*** **Use care not to damage the engine front cover or the crankshaft when removing the seal.**

   Discard the specified component. Follow local disposal regulations.
   Special Tool(s): Remover, Oil Seal 303-409.



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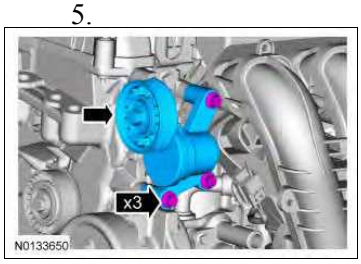
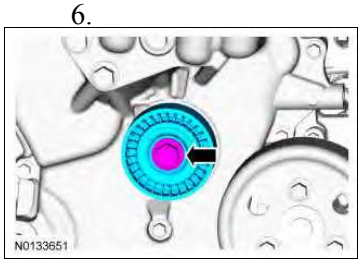


6.



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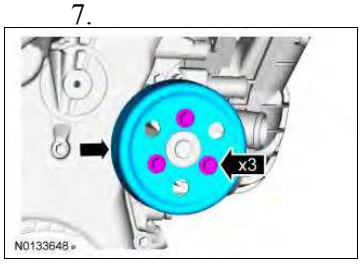

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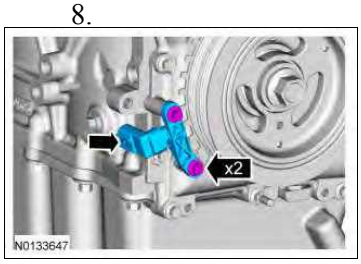
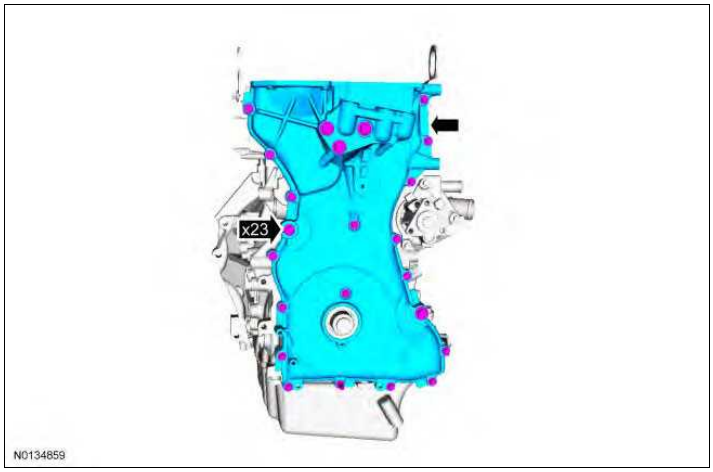


9.



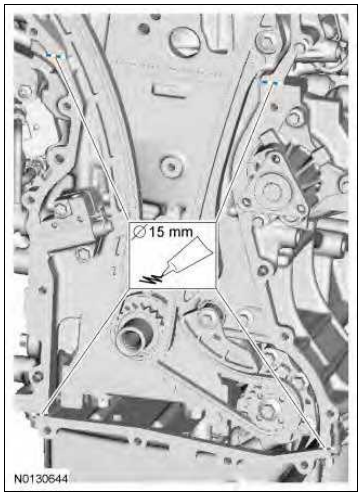
Installation

1. *NOTICE:* **Do not use metal scrapers, wire brushes, power abrasive disks or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.**

   Clean all mating surfaces with Motorcraft® Metal Surface Prep.

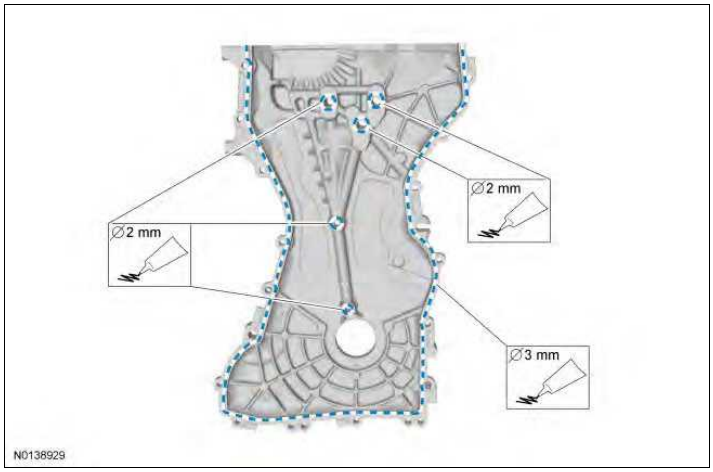
2. **NOTE:** The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motrcraft® Metal Surface Prep.

   Apply a continuous bead of the specified diameter from the specified tube.
   Material: Silicone Gasket and Sealant TA-30.

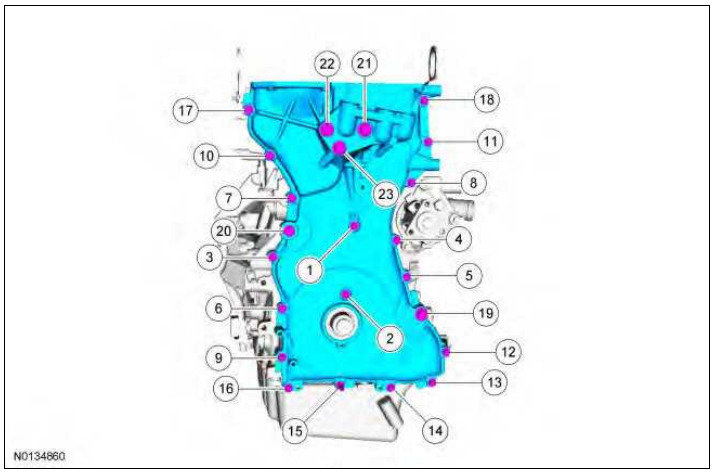


3. **NOTE:** The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the engine front cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motorcraft® Metal Surface Prep.

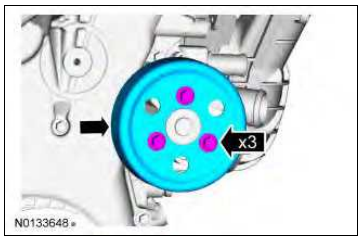
   Apply a continuous bead of the specified diameter from the specified tube.
   Material: Silicone Gasket and Sealant TA-30.



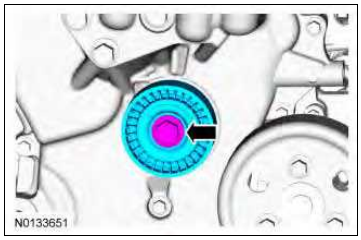
4. Tighten to:
   - Stage 1: Tighten bolts 1 - 18 to 10 Nm (89 lb-in).
   - Stage 2: Tighten bolt 19 to 48 Nm (35 lb-ft).
   - Stage 3: Tighten bolt 20 to 25 Nm (18 lb-ft).
   - Stage 4: Tighten bolts 21 - 23 to 48 Nm (35 lb-ft).



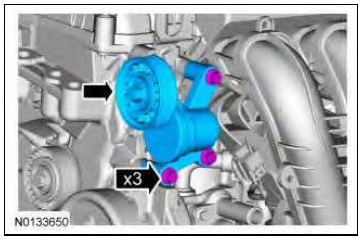
5. ♦ Tighten to 20 Nm (177 lb-in).



6. • Tighten to 11 Nm (97 lb-in).

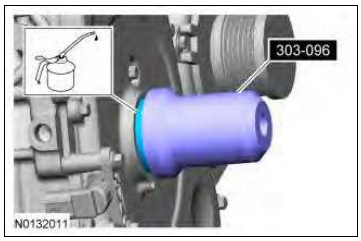


7. • Tighten to 25 Nm (18 lb-ft).



8. **NOTE:** Remove the through bolt from the Camshaft Front Oil Seal Installer.

   Apply the specified lubricant to the specified component.
   Special Tool(s): Installer, Camshaft Front Oil Seal 303-096
   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.

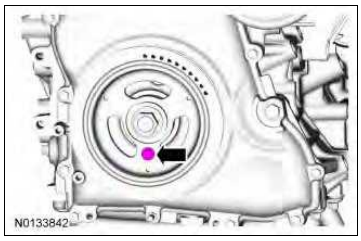


9. Install the engine mount. Refer to Engine Mount .

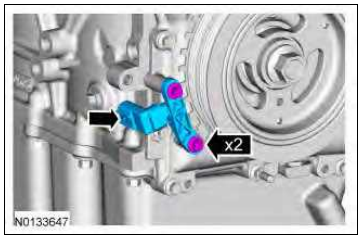
10. Install the crankshaft pulley. Refer to Crankshaft Pulley .

11. ***NOTICE:*** **Only hand-tighten the bolt or damage to the front cover can occur.**

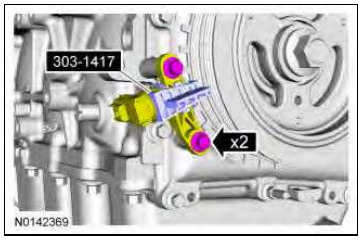
    General Equipment: M6 Bolt.



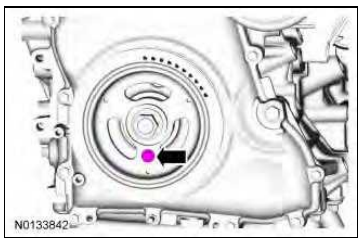
12. **NOTE:** Do not tighten the bolts at this time.



13. Special Tool(s): Crankshaft Sensor Aligner 303-1417.
    - Tighten to 7 Nm (62 lb-in).



14. Remove the General Equipment: M6 Bolt.



15. Using the scan tool, perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.
    Special Tool(s): Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

Timing Drive Components

General Equipment

Holding Pin
Small Pick

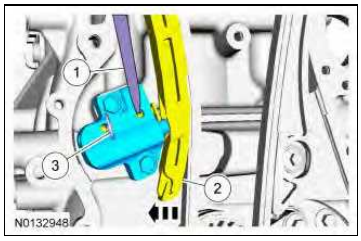
Removal

NOTICE: **Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.**

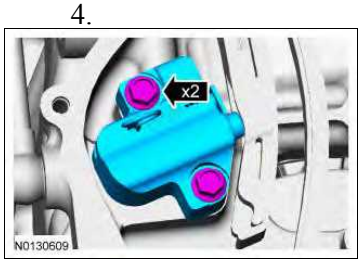
NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to
2. Remove the engine front cover. Refer to Engine Front Cover .

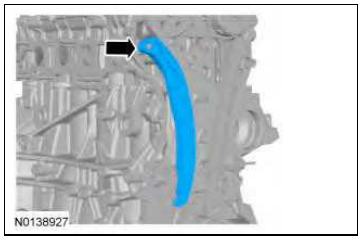
3. General Equipment: Small Pick and Holding Pin.
    1. Using a small pick, release and hold the ratchet mechanism.
    2. While holding the ratchet mechanism in the released position, compress the tensioner by pushing the timing chain arm toward the tensioner.
    3. Insert the holding pin into the hole to retain the tensioner.



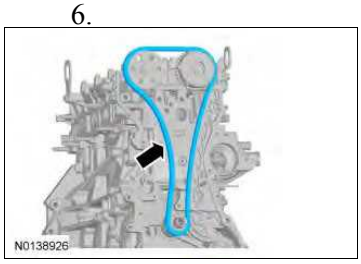
4.



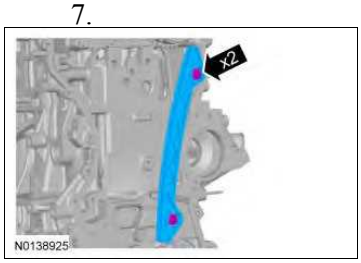
5.



6.

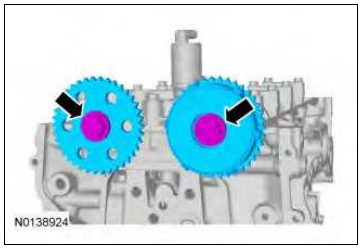


7.



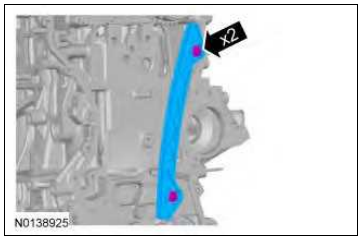
8. *NOTICE:* **The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.**

   NOTE: Using the flats on the camshaft to prevent camshaft rotation.

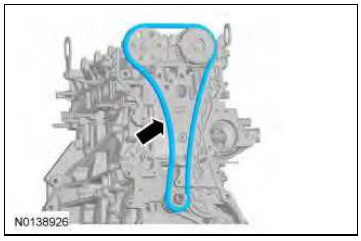


Installation

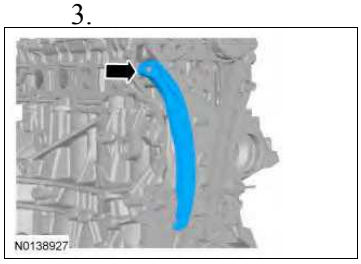
1. • Tighten to 10 Nm (89 lb-in).



2.



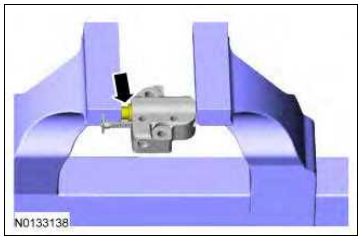
3.



NOTE: If the timing chain plunger and ratchet assembly are not pinned in the compressed position, follow the next 4 steps.

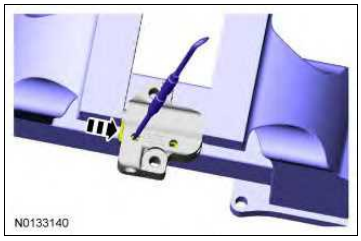
4. ***NOTICE:*** **Do not compress the ratchet assembly. This will damage the ratchet assembly.**

   Using the edge of a vise, compress the timing chain tensioner plunger.

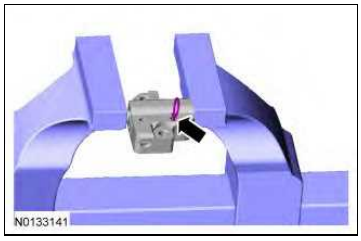


5. General Equipment: Small Pick.
   Using a small pick, push back and hold the ratchet mechanism.

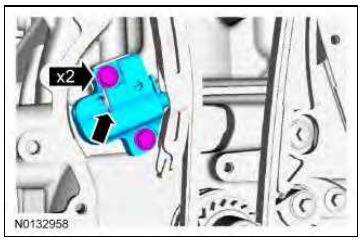
6. General Equipment: Small Pick.
   While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.



7. General Equipment: Holding Pin.
   Install a holding pin into the hole in the tensioner housing to hold the ratchet assembly and the plunger in during installation.



8. • Tighten to 10 Nm (89 lb-in).
   • Remove the holding pin to release the piston.

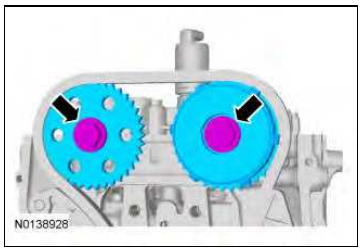


9. ***NOTICE:*** **The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.**

   NOTE: Using the flats on the camshafts to prevent camshaft rotation.

   Tighten to:

   • Stage 1: Tighten to 40 Nm (30 lb-ft).
   • Stage 2: Tighten an additional 60 degrees.



10. Install the engine front cover. Refer to Engine Front Cover .

Camshafts

Special Tool(s)

 ST2545-A	Alignment Plate, Camshaft 303-465 (T94P-6256-CH)

Material

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

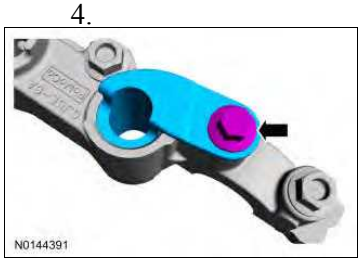
NOTICE: **Do not rotate the camshafts unless instructed to in this procedure. Rotating the camshr crankshaft with timing components loosened or removed can cause serious damage to the valves and pistons.**

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

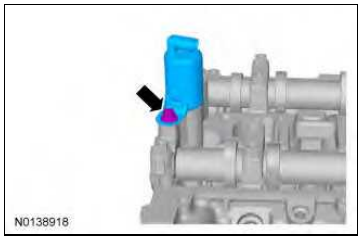
2. Check the valve clearance. Refer to Valve Clearance Check .

3. Remove the camshaft phaser and sprockets. Refer to Camshaft Phaser and Sprocket .

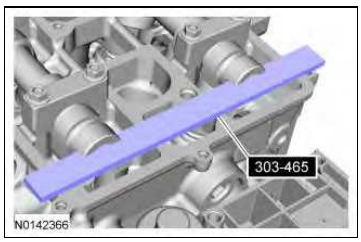
4.



5.



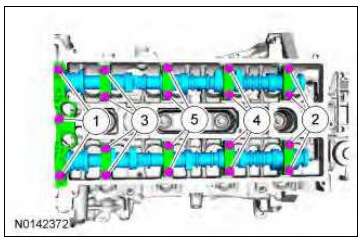
6. Remove Special Tool(s): Alignment Plate, Camshaft 303-465.



7. *NOTICE:* **Failure to follow the camshaft loosening procedure can result in damage to the camshafts.**

   NOTE: Mark the location and orientation of each camshaft bearing cap.

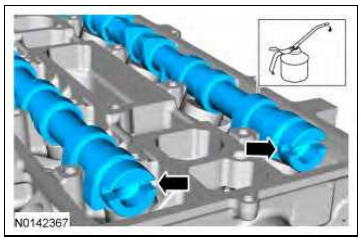
   Loosen the camshaft bearing cap bolts, in sequence, one turn at a time until all tension is released from the camshaft bearing caps.



Installation

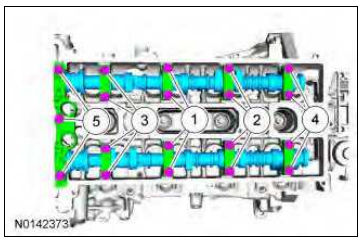
1. *NOTICE:* **Install the camshafts with the alignment slots in the camshafts lined up so the Camshaft Alignment Plate can be installed without rotating the camshafts. Make sure the lobes on the No. 1 cylinder are in the same position as noted in the removal procedure. Rotating the camshafts when the timing chain is removed, or installing the camshafts 180 degrees out of position can cause severe damage to the valves and pistons.**

   Apply the specified lubricant to the specified component.
   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.



2. Tighten to:
   - Stage 1: Tighten the camshaft bearing cap bolts one turn at a time, until finger-tight.
   - Stage 2: Tighten to 7 Nm (62 lb-in).

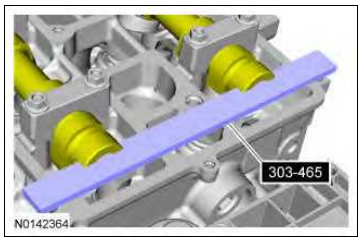
- Stage 3: Tighten to 16 Nm (142 lb-in).



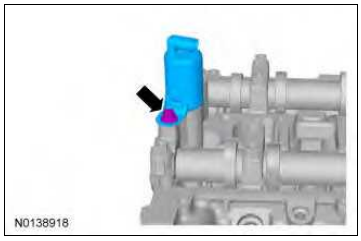
3. *NOTICE:* **The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.**

   NOTE: The camshaft timing slots are offset. If the Camshaft Alignment Plate cannot be installed, rotate the crankshaft one complete revolution clockwise to correctly position the camshafts.

   Special Tool(s): Alignment Plate, Camshaft 303-465.



4. - Tighten to 11 Nm (97 lb-in).



5. - Tighten to 11 Nm (97 lb-in).

6. Install the camshaft phaser and sprockets. Refer to Camshaft Phaser and Sprocket .

Camshaft Phaser and Sprocket

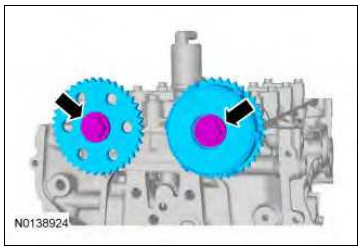
Removal and Installation

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

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

1. Remove the timing drive components. Refer to Timing Drive Components .

2. • Do not tighten the camshaft phaser and sprocket and the exhaust camshaft sprocket at this time. The bolts will be tightened during the timing drive component installation procedure.



3. To install, reverse the removal procedure.

Valve Springs

Special Tool(s)

 ST1981-A	Compressor, Valve Spring 303-300 (T87C-6565-A)
 ST1907-A	Compressor, Valve Spring 303-350 (T89P-6565-A)
 ST1902-A	Compressor, Valve Spring 472 (T94P-6565-AH)

Material

Item	Specification
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B

Removal

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

2. Remove the valve tappets. Refer to Valve Tappets .

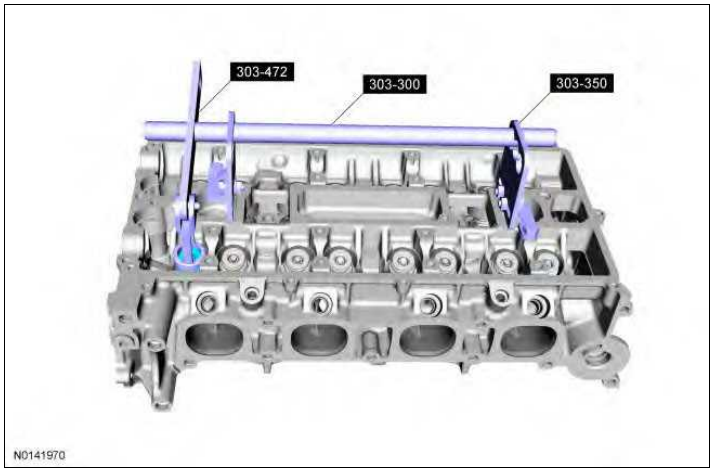
3. Remove the spark plugs. Refer to Section 303-07C .

4. ***NOTICE:*** **Use compressed air at 7 to 10 bars (100-150 psi). Do not disconnect the compressed air from the cylinder until the valve spring, valve spring retainer and valve collet is installed. Any loss of air pressure will allow the valve to fall into the cylinder.**

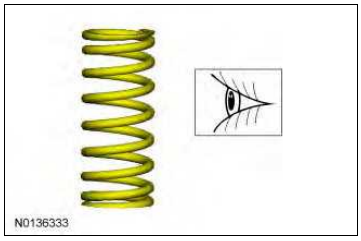
   Connect the compressed air supply to cylinder No. 1.

5. **NOTE:** Use a small screwdriver and multi-purpose grease to remove the valve collets.

   Remove the valve collets, valve spring retainers and the valve springs.
   Special Tool(s): Compressor, Valve Spring 303-300, Compressor, Valve Spring 303-350 and Compressor, Valve Spring 303-472.
   Material: Multi-Purpose Grease XG-4 and/or XL-5.



6. Visual check
    - Install new parts, as necessary.

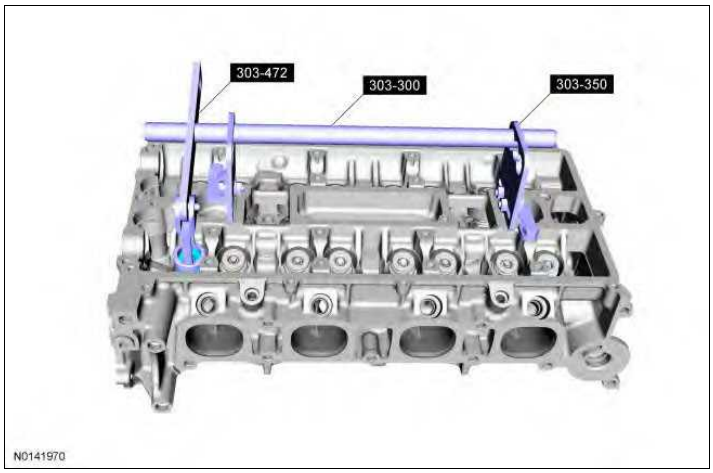


Installation

1. **NOTE:** Check the seating of the valve collets.

   Install the valve springs, valve spring retainers and the valve collets.
   Special Tool(s): Compressor, Valve Spring 303-300, Compressor, Valve Spring 303-350 and Compressor, Valve Spring 303-472.
   Material: Multi-Purpose Grease XG-4 and/or XL-5.

   - Compress the valve spring and install the valve collets, using multi-purpose grease and a small screwdriver.
   - Check the seating of the valve collets.



2. Disconnect the compressed air supply.

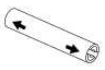
3. Repeat the appropriate removal and installation steps for all of the other cylinders.

4. Install the spark plugs. Refer to Section 303-07C .

5. Install the valve tappets. Refer to Valve Tappets .

Valve Seals

Special Tool(s)

 ST1981-A	Compressor, Valve Spring 303-300 (T87C-6565-A)
 ST1907-A	Compressor, Valve Spring 303-350 (T89P-6565-A)
 ST1902-A	Compressor, Valve Spring 303-(T94P-6565-AH)
 ST1906-A	Installer, Valve Stem Oil Seal 303-470 (T94P-6510-CH)
 ST1904-A	Remover, Valve Stem Oil Seal 303-468 (T94P-6510-AH)
 ST1187-A	Slide Hammer 307-005 (T59L-100-B)

Material

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B

Removal

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oilassages, coolant passages or the oil pan can cause engine failure.**

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

2. Remove the valve tappets. Refer to Valve Tappets .

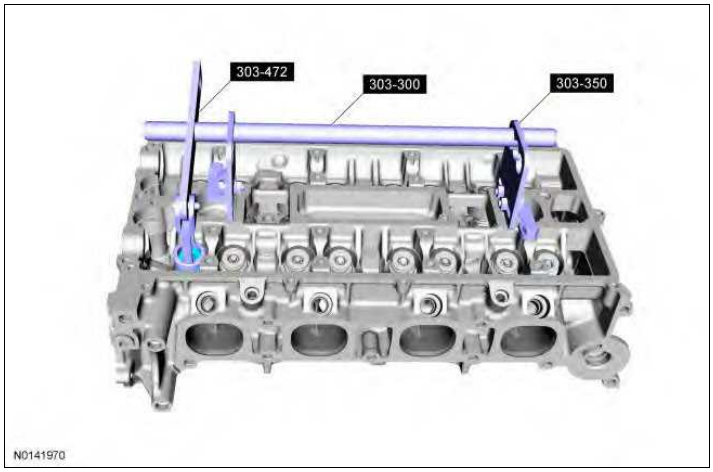
3. Remove the spark plugs. Refer to Section 303-07C .

4. *NOTICE:* **Use compressed air at 7 to 10 bars (100-150 psi). Do not disconnect the compressed air from the cylinder until the valve spring, valve spring retainer and valve collet is installed. Any loss of air pressure will allow the valve to fall into the cylinder.**

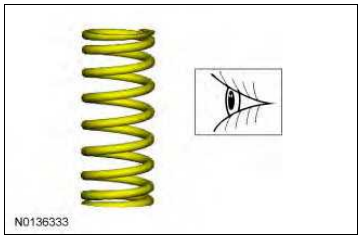
   Connect the compressed air supply to cylinder No. 1.

5. **NOTE:** Use a small screwdriver and multi-purpose grease to remove the valve collets.

   Remove the valve collets, valve spring retainers and the valve springs.
   Special Tool(s): Compressor, Valve Spring 303-300, Compressor, Valve Spring 303-350 and Compressor, Valve Spring 303-472.
   Material: Multi-Purpose Grease XG-4 and/or XL-5.



6. Visual check
   - Install new parts, as necessary.



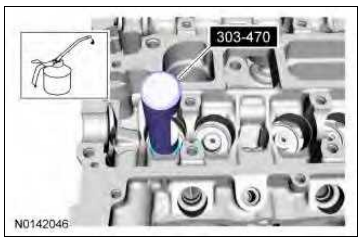
7. Discard the specified component. Follow local disposal regulations.
   Special Tool(s): Remover, Valve Stem Oil Seal 303-468 and Slide Hammer 307-005.

Installation

1. **NOTE:** Use the protector provided with the replacement kit to prevent damage to the valve seals.

   Apply the specified lubricant to the specified component.
   Special Tool(s): Installer, Valve Stem Oil Seal 303-470.

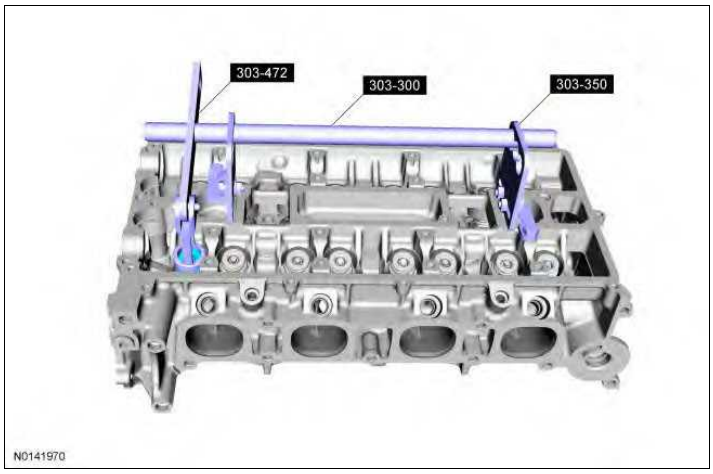
Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.



2. **NOTE:** Check the seating of the valve collets.

   Install the valve springs, valve spring retainers and the valve collets.
   Special Tool(s): Compressor, Valve Spring 303-300, Compressor, Valve Spring 303-350 and Compressor, Valve Spring 303-472.
   Material: Multi-Purpose Grease XG-4 and/or XL-5.

   - Compress the valve spring and install the valve collets, using multi-purpose grease and a small screwdriver.
   - Check the seating of the valve collets.



3. Disconnect the compressed air supply.

4. Repeat the appropriate removal and installation steps for all of the other cylinders.

5. Install the spark plugs. Refer to Section 303-07C .

6. Install the valve tappets. Refer to Valve Tappets .

Valve Tappets

Material

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

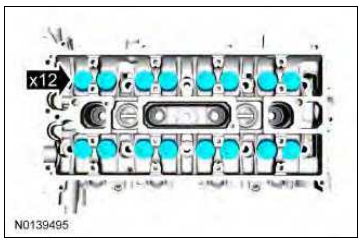
NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

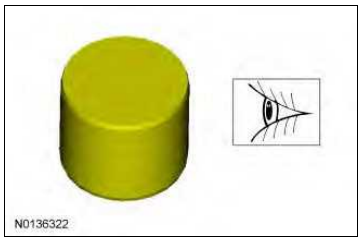
2. Remove the camshafts. Refer to Camshafts .

3. **NOTE:** If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.

   NOTE: The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

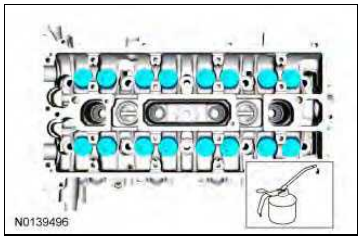


4. Visual check.



Installation

1. Apply the specified lubricant to the specified component.
   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.



2. Install the camshafts. Refer to Camshafts .

Cylinder Head

Material

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Silicone Gasket Remover ZC-30	-

Removal

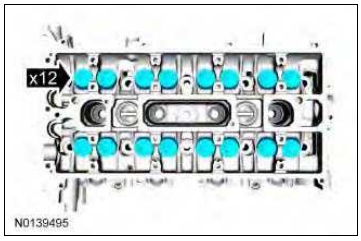
NOTICE: **Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft anmust be locked in place by the special service tools, otherwise severe engine damage can occur.**

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan may cause engine failure.**

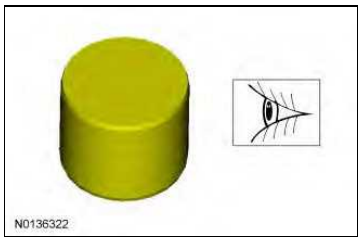
1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .
2. Release the fuel system pressure. Refer to Section 310-00 .
3. Drain the engine cooling system. Refer to Section 303-03 .
4. Remove the ACL and the ACL outlet pipe. Refer to Section 303-12 .
5. Remove the intake manifold. Refer to Intake Manifold .
6. Remove the fuel injectors. Refer to Section 303-04C .
7. Remove the camshafts. Refer to Camshafts .

8. **NOTE:** If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.

   The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.



9. Visual check.



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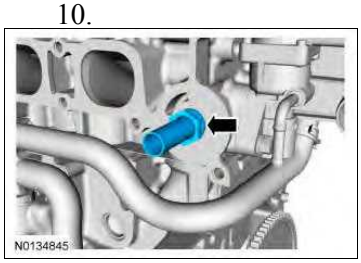
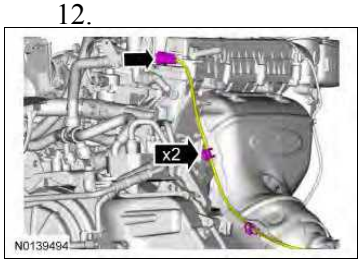
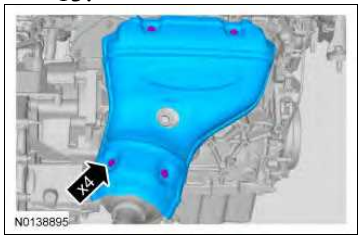


11. Remove the HO2S . Refer to Section 303-14 .

12.



13.



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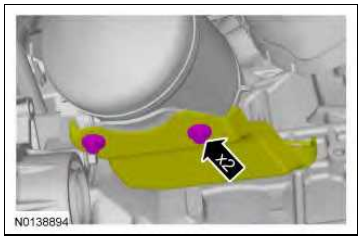
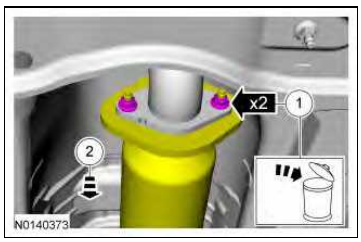
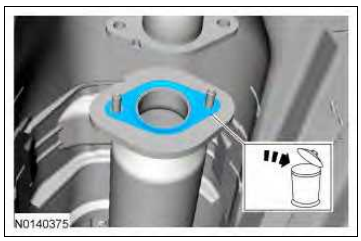


15. Discard the specified component. Follow local disposal regulations.



16. Discard the specified component. Follow local disposal regulations.



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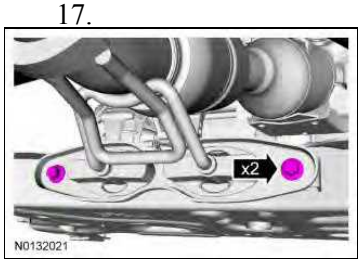
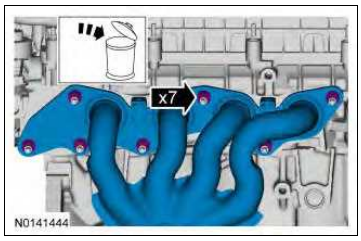
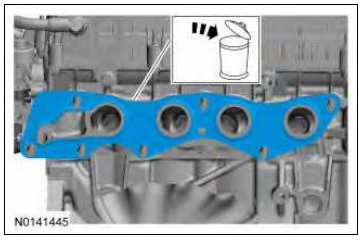


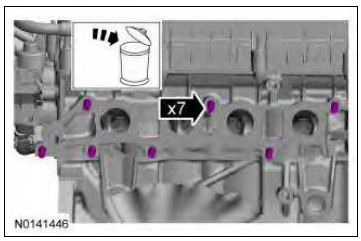
18. Discard the specified component. Follow local disposal regulations.



19. Discard the specified component. Follow local disposal regulations.



20. Discard the specified component. Follow local disposal regulations.



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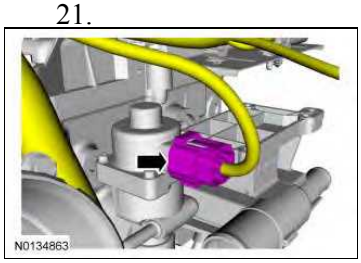

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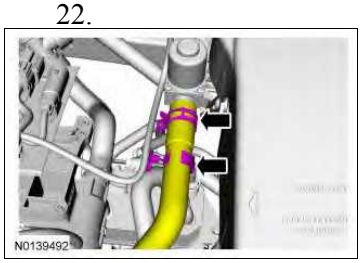

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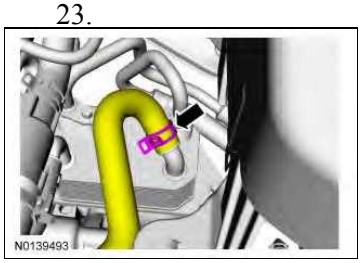

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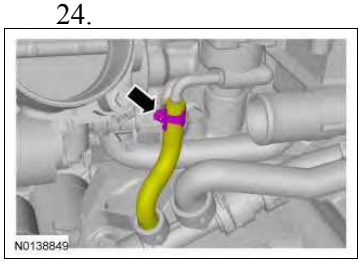

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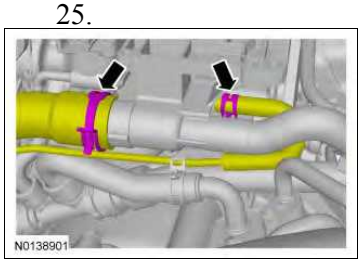

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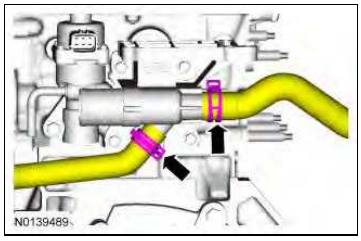
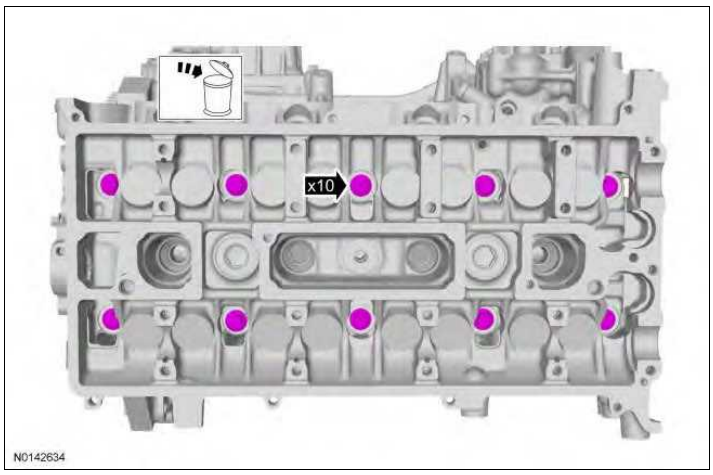
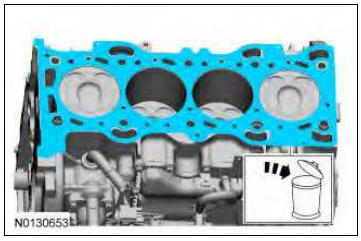


27. Discard the specified component. Follow local disposal regulations.



28. Discard the specified component. Follow local disposal regulations.



Installation

1. *NOTICE:* **Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.**

   NOTE: Observe all warnings or cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.

   NOTE: If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.

   Clean the cylinder head-to-cylinder block mating surface of both the cylinder head and the cylinder block in the following sequence.
   Material: Motorcraft® Silicone Gasket Remover and Motorcraft® Metal Surface Prep.

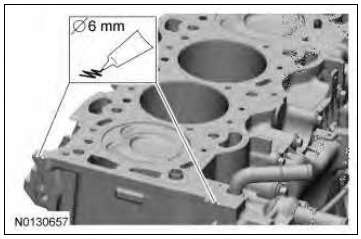
   1. Remove any large deposits of silicone or gasket material with a plastic scraper.
   2. Apply silicone gasket remover, following package directions, and allow to set for several minutes.
   3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.

4. Apply metal surface prep, following package directions, to remove any traces of oil or coolant, and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.

2. Support the cylinder head on a bench with the head gasket side up. Check the cylinder head distortion and the cylinder block distortion. Rer to Section 303-00 .

3. Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.

4. Apply the specified sealant to the specified component.
   Material: Silicone Gasket and Sealant TA-30.



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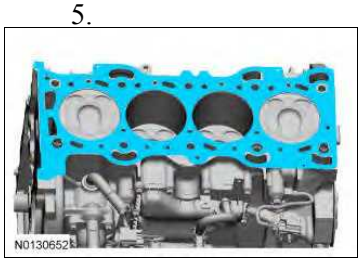
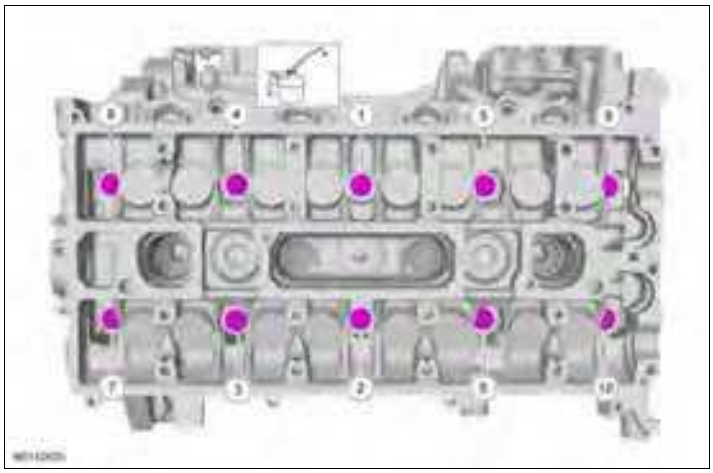


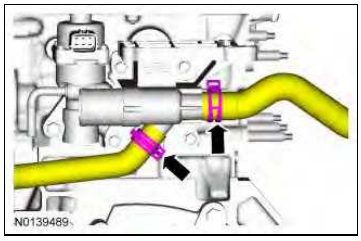
6. **NOTE:** The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed.

   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.
   Tighten to:

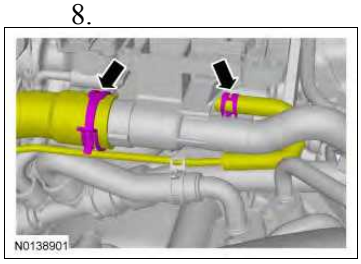
   - Stage 1: Tighten to 7 Nm (62 lb-in).
   - Stage 2: Tighten to 15 Nm (133 lb-in).
   - Stage 3: Tighten to 45 Nm (33 lb-ft).
   - Stage 4: Turn 90 degrees.
   - Stage 5: Turn an additional 90 degrees.



7.



8.



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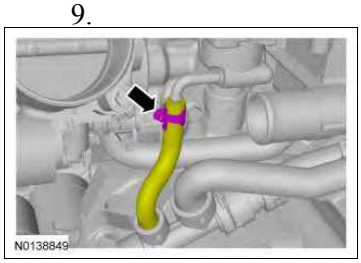
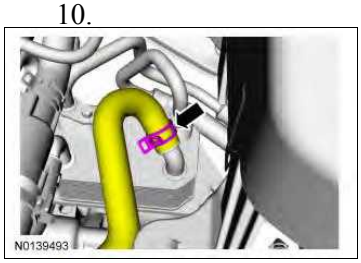
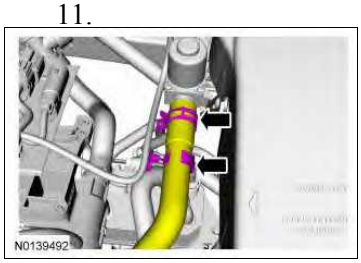


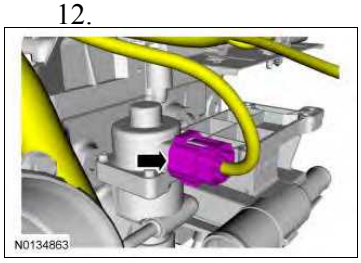
10.



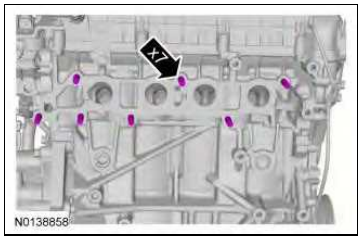
11.



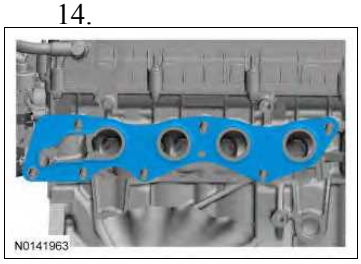
12.



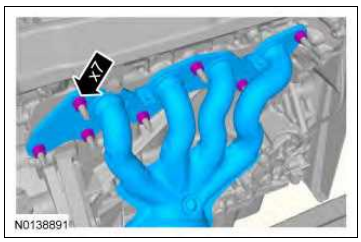
13. • Tighten to 17 Nm (150 lb-in).



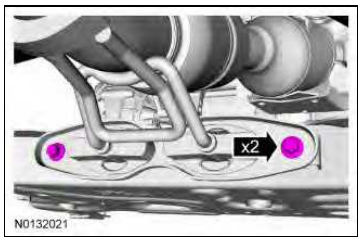
14.



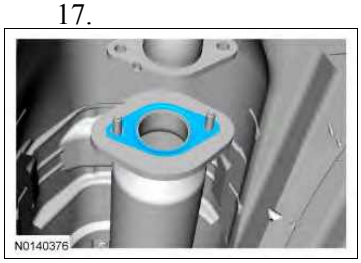
15. • Tighten to 55 Nm (41 lb-ft).



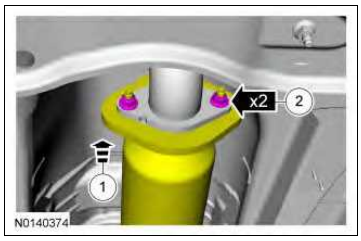
16. • Tighten to 25 Nm (18 lb-ft).



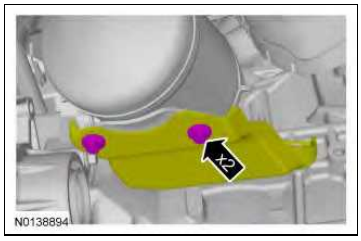
17.



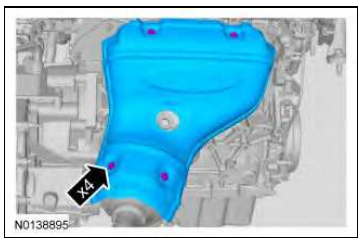
18. • Tighten to 48 Nm (35 lb-ft).



19. • Tighten to 25 Nm (18 lb-ft).



20. • Tighten to 11 Nm (97 lb-in).



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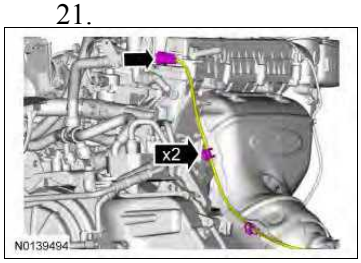
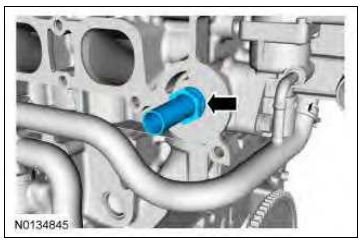
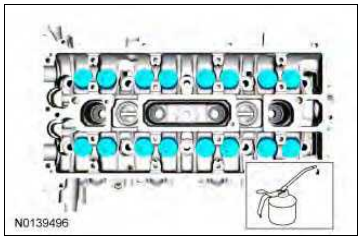


22. Install the HO2S . Refer to Section 303-14 .

23. • Tighten to 55 Nm (41 lb-ft).



24. Apply the specified lubricant to the specified component.
Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.



25. Install the camshafts. Refer to Camshafts .

26. Install the fuel injectors. Refer to Section 303-04C .

27. Install the intake manifold. Refer to Intake Manifold .

28. Install the ACL and the ACL outlet pipe. Refer to Section 303-12 .

29. Fill and bleed the engine cooling system. Refer to Section 303-03 .

Oil Filter Adapter

Material

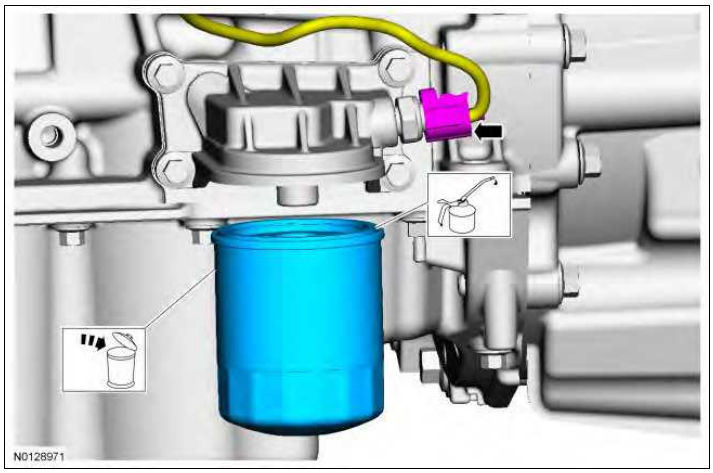
Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal and Installation

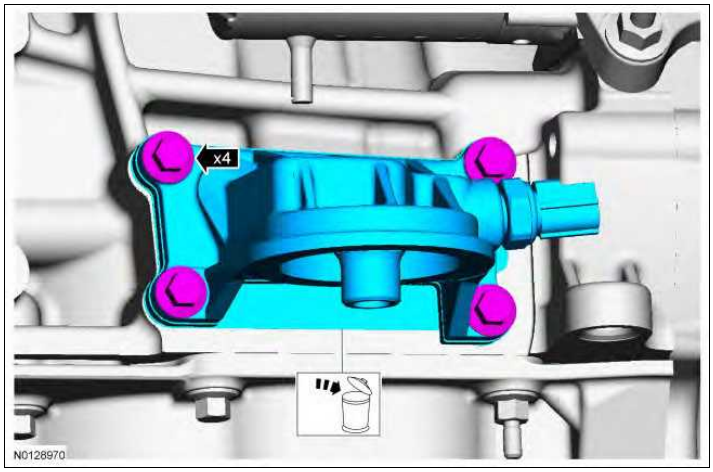
NOTE: Removal steps in this procedure may contain installation details.

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

2. Discard the specified component. Follow local disposal regulations.
   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.
   - To install, lubricate the spin-on oil filter gasket with clean engine oil and tighten the oil filter three-fourths turn after the oil filter gasket makes contact w oil filter adapter.



3. Discard the specified component. Follow local disposal regulations.
   - To install, tighten to 25 Nm (18 lb-ft).



4. To install, reverse the removal procedure.

Engine Oil Pressure (EOP) Switch

Material

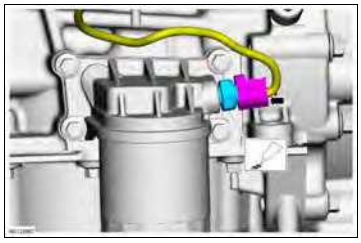
Item	Specification
Thread Sealant with PTFE TA-24	WSK-M2G350-A2

Removal and Installation

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

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

2. Apply the substance from the specified tube.
   Material: Thread Sealant with PTFE TA-24.
   - To install, tighten to 15 Nm (133 lb-in).



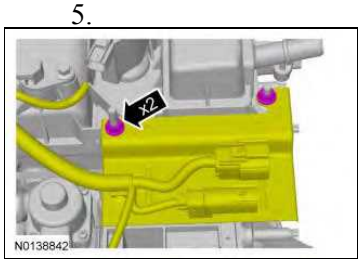
3. To install, reverse the removal procedure.

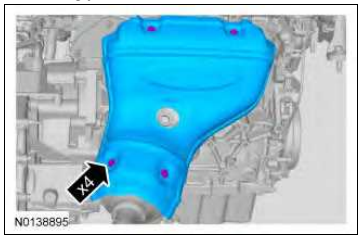
Oil Pan

Material

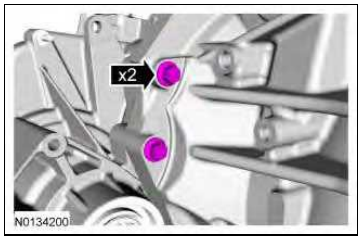
Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .
2. Remove the Air Cleaner (ACL) and the ACL outlet pipe. Refer to Section 303-12 .
3. Remove the cowl panel. Refer to Section 501-02 .
4. Remove the HO2S and CMS . Refer to Section 303-14 .
5. 

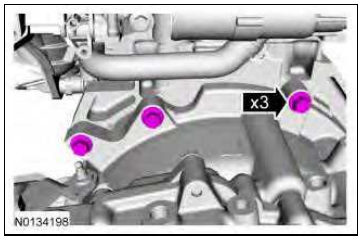
6. 

7. Loosen the 2 RH engine-to-bellhousing bolt 5 mm (0.19 in).



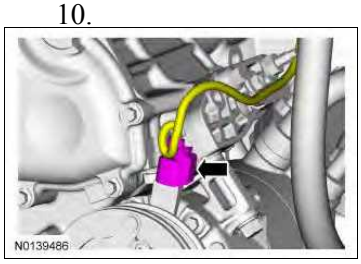
8. ***NOTICE:*** **To prevent damage to the transmission, do not loosen the transmission-to-engine bolts more than 5 mm (0.19 in).**

   Loosen the 3 upper bellhousing-to-engine bolts 5 mm (0.19 in).

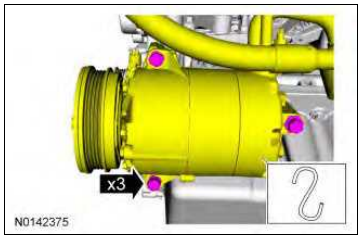


9. Remove the A/C belt. Refer to Section 303-05 .

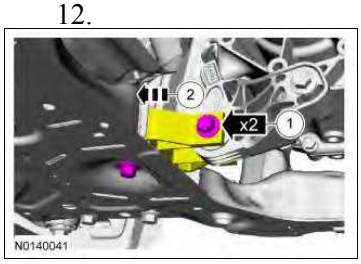
10.



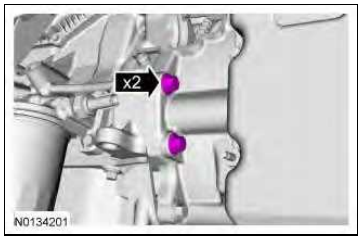
11. Relocate and support the component.



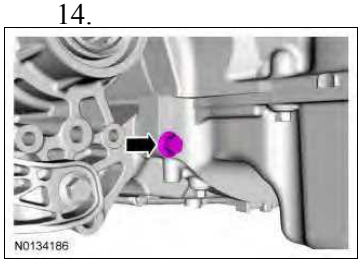
12.



13. Loosen the 2 LH bellhousing-to-engine bolts 5 mm (0.19 in).



14.



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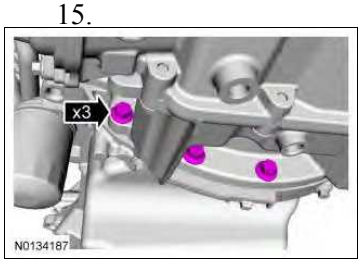
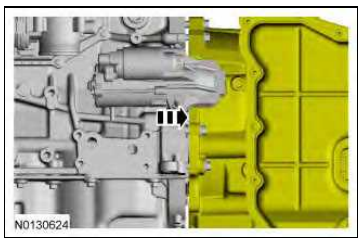
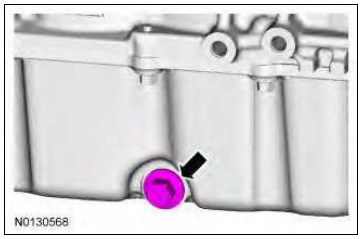


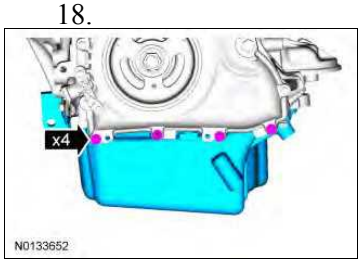
16. Slide the transaxle rearward 5 mm (0.19 in).



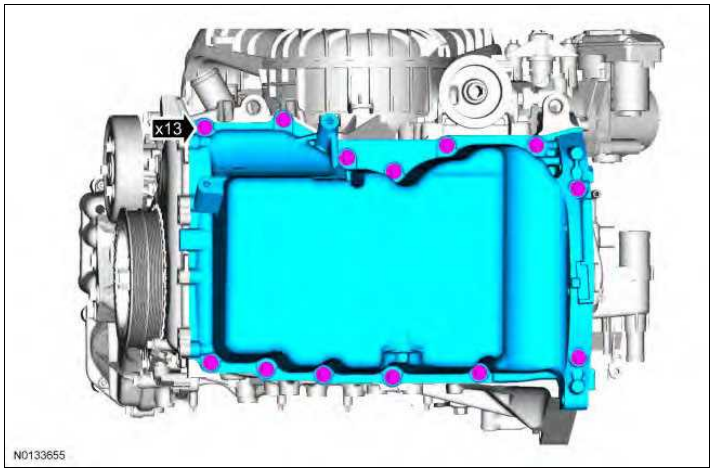
17. • To install, tighten to 28 Nm (21 lb-ft).



18.



19.



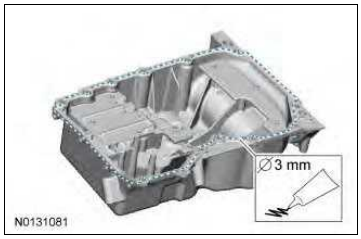
20. *NOTICE:* **Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.**

    Clean all mating surfaces with Motorcraft® Metal Surface Prep.

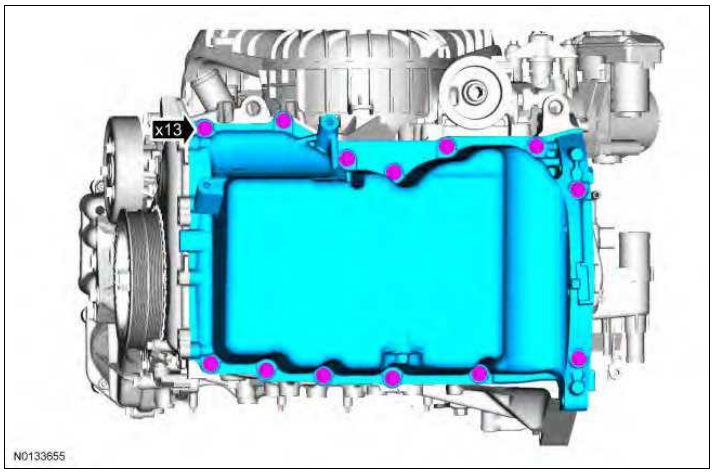
Installation

1. **NOTE:** If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the seling area cleaned with metal surface prep. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

   Apply a continuous bead of the specified diameter from the specified tube.
   Material: Silicone Gasket and Sealant TA-30.

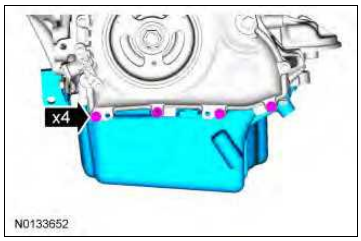


2. Finger tight.

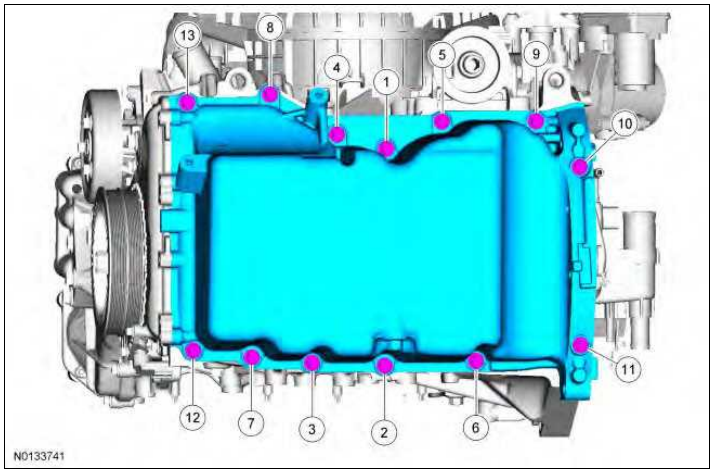


3. **NOTE:** The engine front cover-to-oil pan bolts must be tightened first to align the front surface of the oil pan flush with the front surface of the engine block.

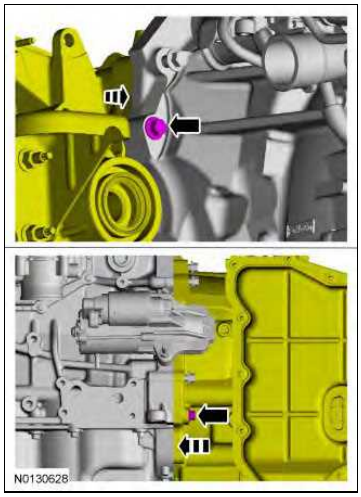
    - Tighten to 10 Nm (89 lb-in).



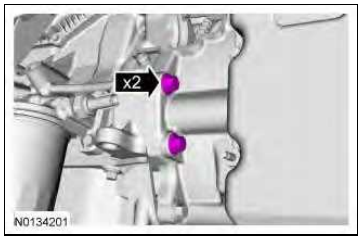
4. - Tighten to 20 Nm (177 lb-in).



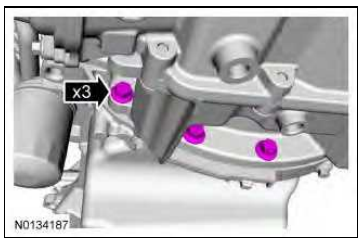
5. Alternate tightening the 1 LH bellhousing-to-engine and 1 RH engine-to-bellhousing bolts to slide the transaxle and engine together.



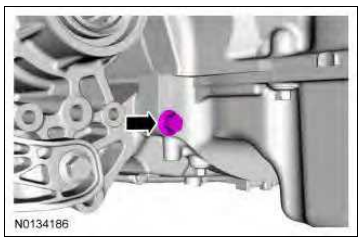
6. - Tighten to 48 Nm (35 lb-ft).



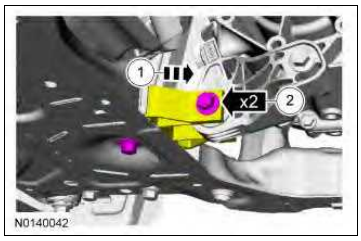
7. • Tighten to 48 Nm (35 lb-ft).



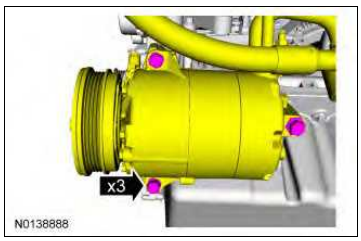
8. • Tighten to 48 Nm (35 lb-ft).



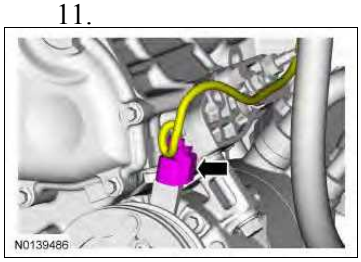
9. • Tighten to 125 Nm (92 lb-ft).



10. • Tighten to 25 Nm (18 lb-ft).

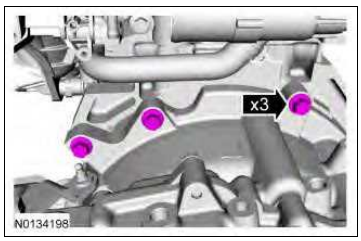


11.

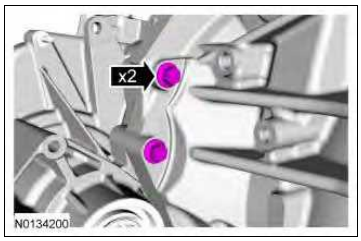


12. Install the A/C belt. Refer to Section 303-05 .

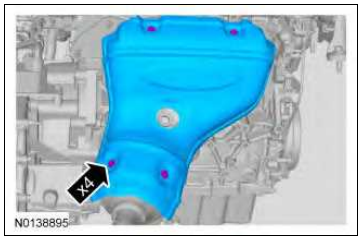
13. • Tighten to 48 Nm (35 lb-ft).



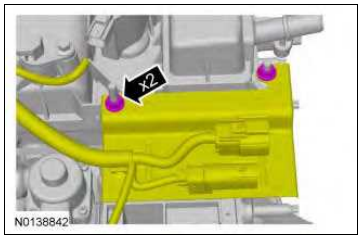
14. • Tighten to 48 Nm (35 lb-ft).



15. Tighten to 11 Nm (97 lb-in).



16. • Tighten to 9 Nm (80 lb-in).



17. Install the HO2S and the CMS . Refer to Section 303-14 .

18. Install the cowl panel. Refer to Section 501-02 .

19. Install the ACL and the ACL outlet pipe. Refer to Section 303-12 .

20. Fill the engine with clean engine oil.
    Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.

Oil Pump Screen and Pickup Tube

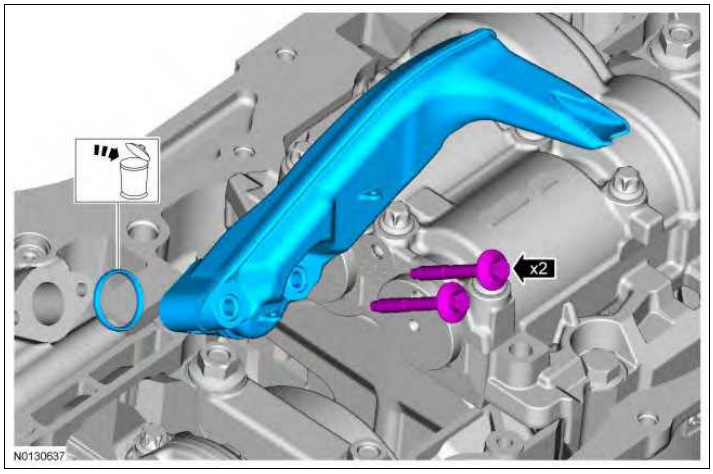
Removal and Installation

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

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

2. Remove the oil pan. Refer to Oil Pan .

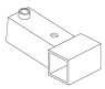
3. Discard the specified component. Follow local disposal regulations.
   - To install, tighten to 10 Nm (89 lb-in).



4. To install, reverse the removal procedure.

Oil Pump

Special Tool(s)

	Support Bar, Engine 303-F072
	Adapter for 303-290-05A
	Adapter for 303-290-19

General Equipment

Floor Jack
Straight Edge
Wood Block

Material

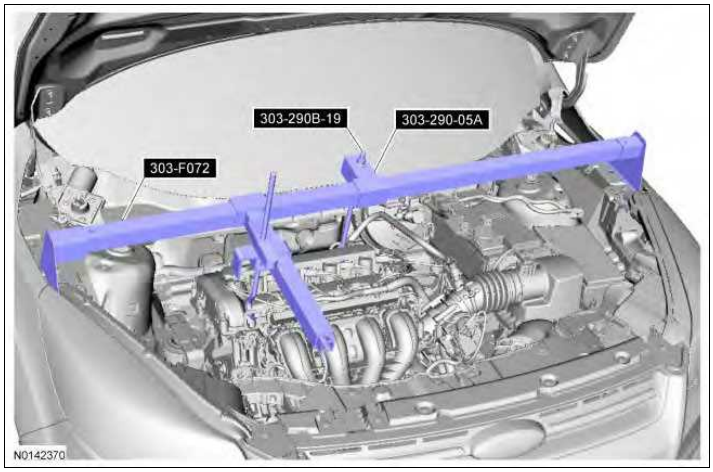
Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Removal

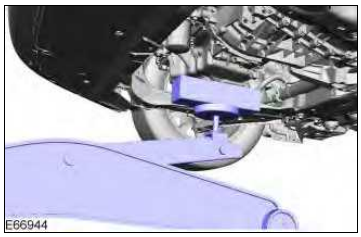
1. With the engine in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

2. Remove the engine front cover. Refer to Engine Front Cover .

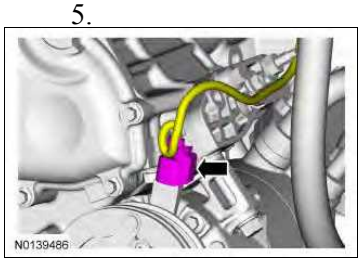
3. Install the Engine Support Bar.
   Special Tool(s): Support Bar, Engine 303-F072, Adapter for 303-290-19 and Adapter for 303-290-05A.



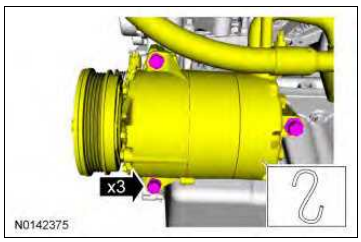
4. Remove the General Equipment: Floor Jack and Wood Block.



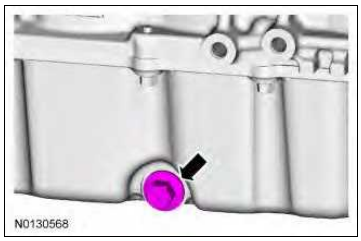
5.



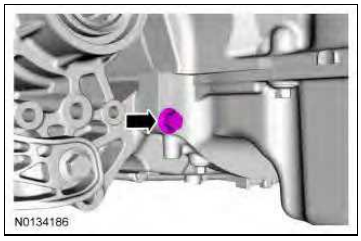
6. Relocate and support the component.



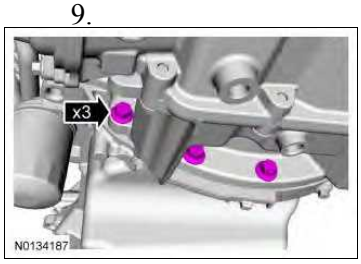
7. • To install, tighten to 28 Nm (21 lb-ft).



8.



9.



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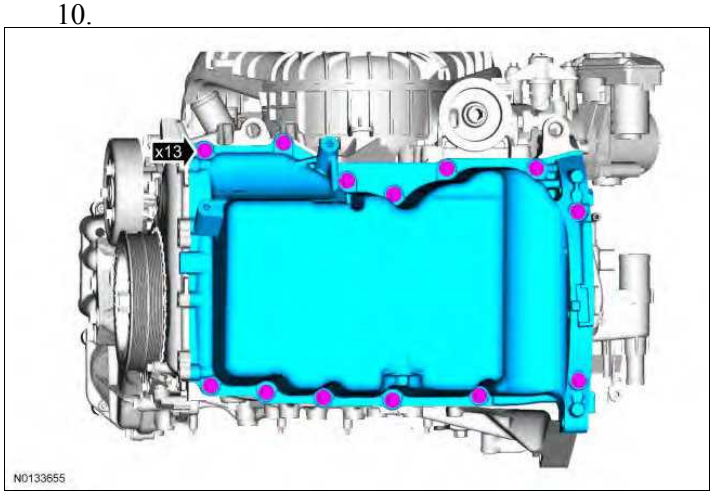
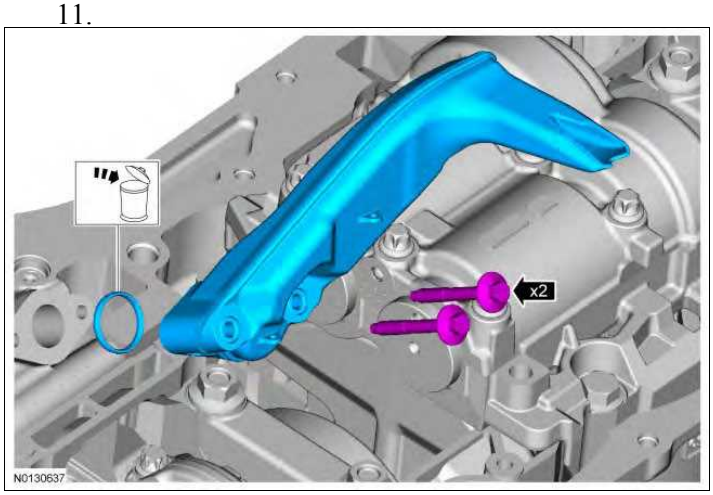
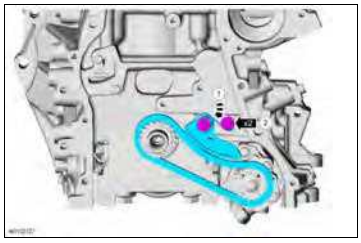


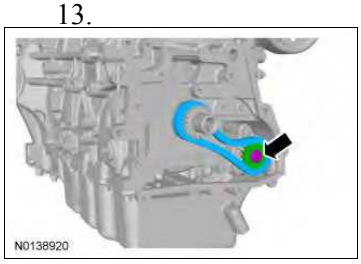
11.



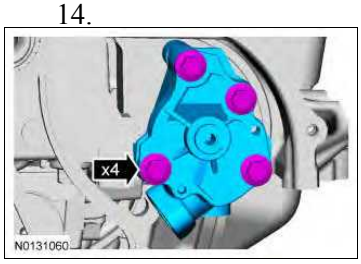
12. 1. Release the tension on the tensioner spring.
2. Remove the tensioner and the 2 shoulder bolts.



13.



14.

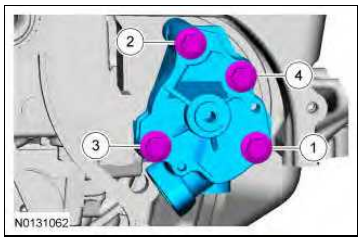


Installation

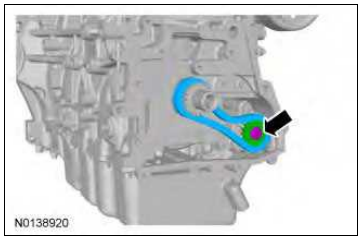
1. **NOTE:** Clean the oil pump and cylinder block mating surfaces with Motorcraft® Metal Surface Prep.

   Tighten to:

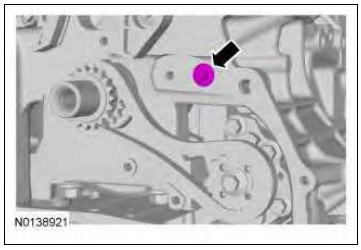
   - Stage 1: Tighten to 10 Nm (89 lb-in).
   - Stage 2: Tighten to 20 Nm (177 lb-in).



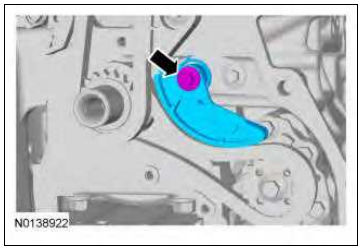
2. • Tighten to 25 Nm (18 lb-ft).



3. • Tighten to 10 Nm (89 lb-in).

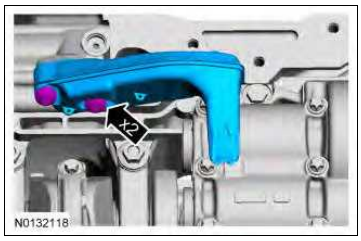


4. • Tighten to 10 Nm (89 lb-in).
   • Hook the tensioner spring around the shoulder bolt.



5. **NOTE:** A new gasket must be installed.

   • Tighten to 10 Nm (89 lb-in).

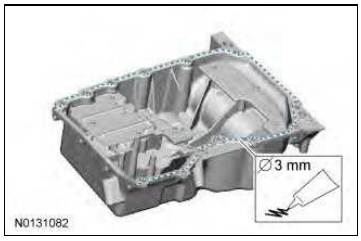


6. *NOTICE:* **Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.**

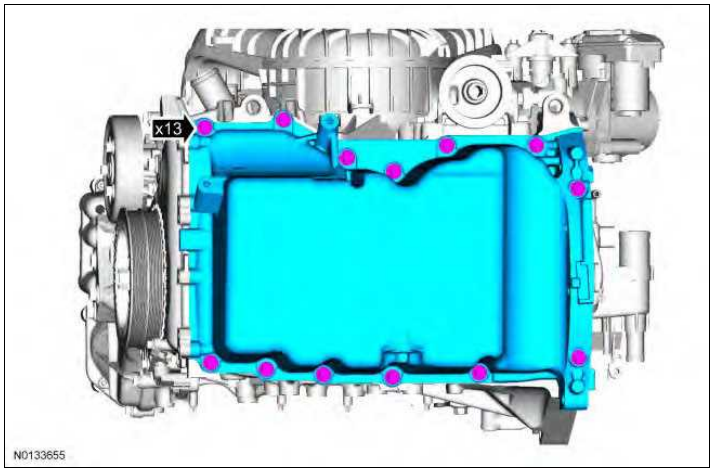
   Clean all mating surfaces with Motorcraft® Metal Surface Prep.

7. **NOTE:** If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned with metal surface prep. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

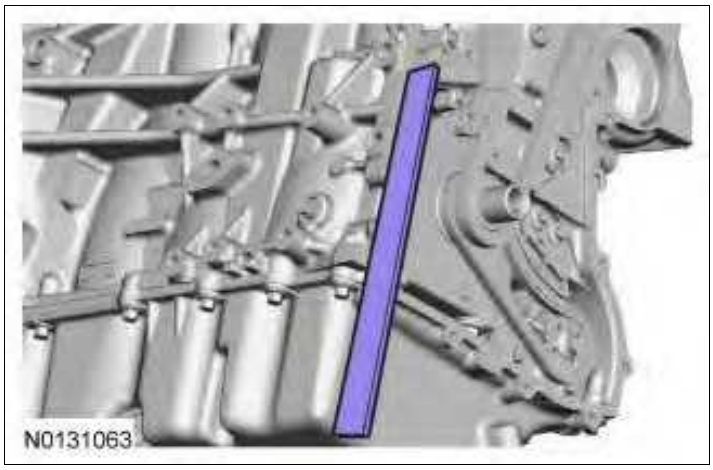
   Apply a continuous bead of the specified diameter from the specified tube.
   Material: Silicone Gasket and Sealant TA-30.



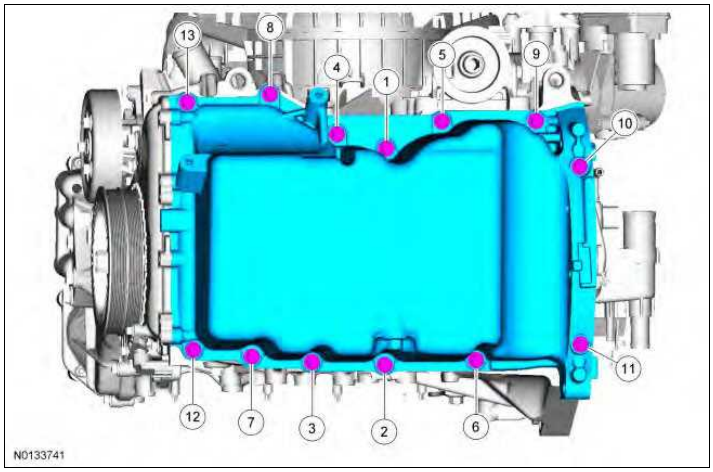
8. Finger tight.



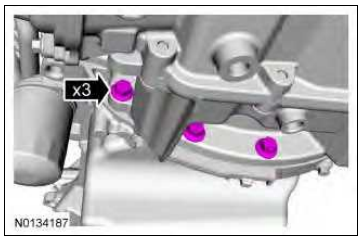
9. General Equipment: Straight Edge.



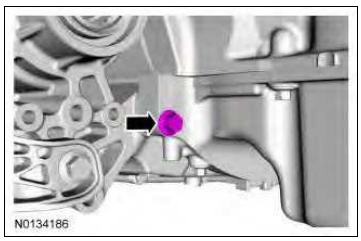
10. • Tighten to 20 Nm (177 lb-in).



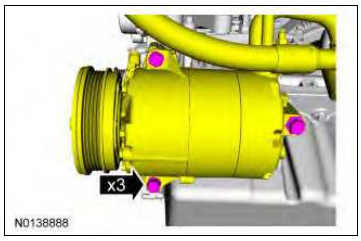
11. • Tighten to 48 Nm (35 lb-ft).



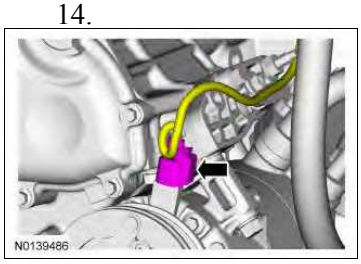
12. • Tighten to 48 Nm (35 lb-ft).



13. • Tighten to 25 Nm (18 lb-ft).

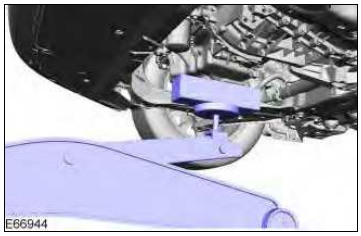


14.

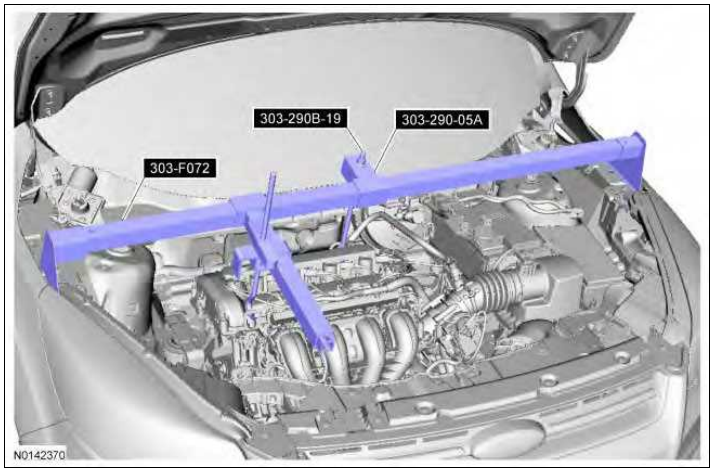


15. ***NOTICE:*** **Failure to position the wood block and floor jack as illustrated can result in damage to the oil pan.**

    Install the General Equipment: Floor Jack and Wood Block.



16. Remove the Engine Support Bar.
    Special Tool(s): Support Bar, Engine 303-F072, Adapter for 303-290-19 and Adapter for 303-290-05A.



17. Install the engine front cover. Refer to Engine Front Cover .

18. Fill the engine with clean engine oil.
    Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.

Engine Mount

General Equipment

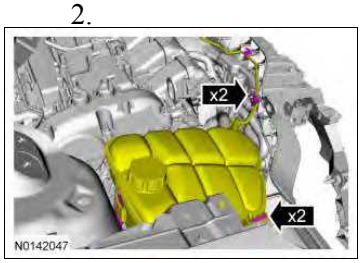
Floor Jack
Wood Block

Removal and Installation

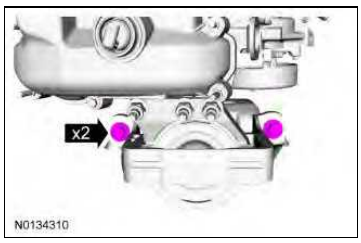
NOTE: Removal steps in this procedure may contain installation details.

1. Remove the cowl panel. Refer to Section 501-02 .

2.

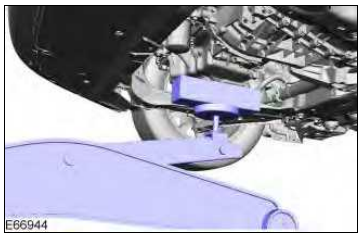


3. • To install, tighten to 90 Nm (66 lb-ft).

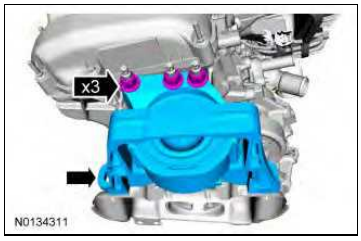


4. *NOTICE:* **Failure to position the wood block and floor jack as illustrated can result in damage to the oil pan.**

   General Equipment: Floor Jack and Wood Block.



5. • To install, tighten to 80 Nm (59 lb-ft).



6. To install, reverse the removal procedure.

Engine

Special Tool(s)

	2,200# Floor Crane, Fold Away 300-OTC1819E or equivalent
	Powertrain Lift 300-OTC1585AE or equivalent
	Adjustable Grip Arm, 1735A 014-00001 or equivalent

General Equipment

Cable Tie
Spreader Bar

⚠ WARNING: Do not smoke, carry lighted tobacco or have an open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to Section 100-02 .

2. Release the fuel system pressure. Refer to Section 310-00 .

3. Drain the cooling system. Refer to Section 303-03 .

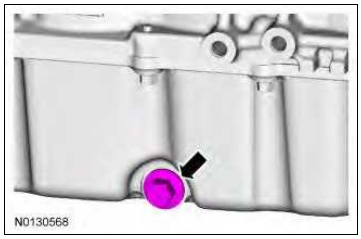
4. Remove the cowl panel. Refer to Section 501-02 .

5. Remove the engine ACL and ACL outlet pipe. Refer to Section 303-12 .

6. Remove the battery tray. Refer to Section 414-01 .

7. Remove the degas bottle. Refer to Section 303-03 .

8. • To install, tighten to 28 Nm (21 lb-ft).

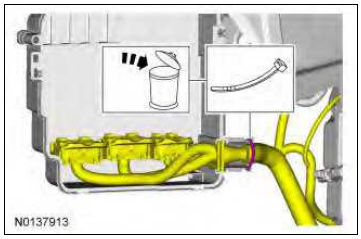


9. Drain the transmission fluid. Refer to Section 307-01 .

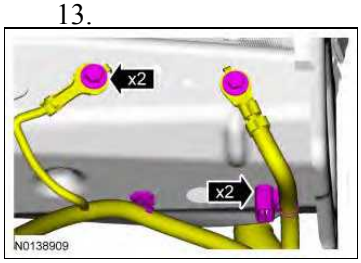
10. Remove the RH and LH halfshafts. Refer to Section 205-04 .

11. Remove the PCM. Refer to Section 303-14 .

12. Remove the cable tie.
    Discard the specified component. Follow local disposal regulations.



13.



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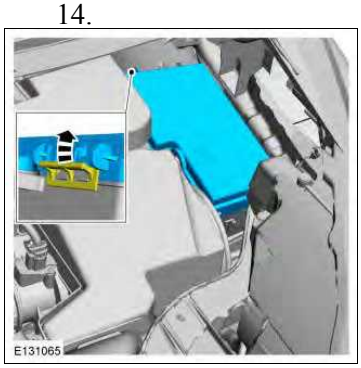
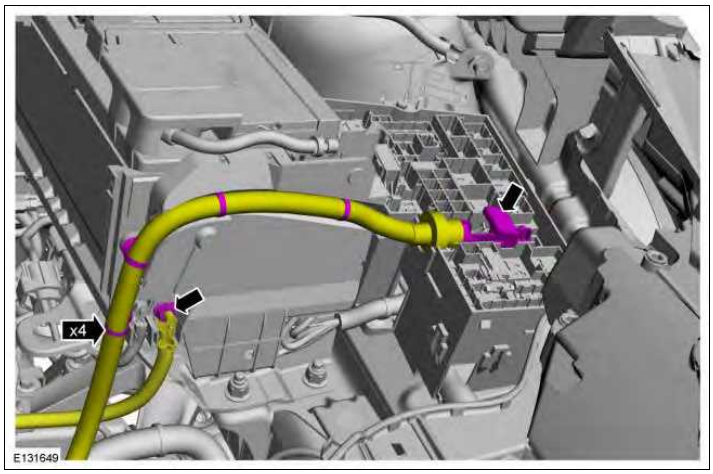


15. .



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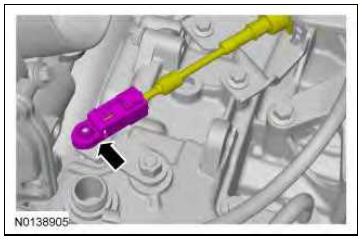

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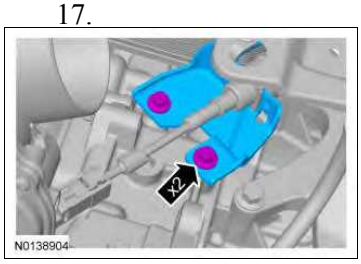

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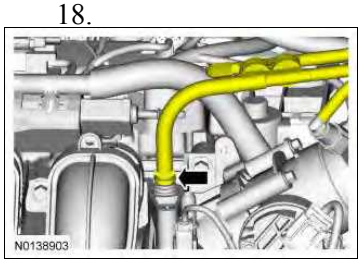
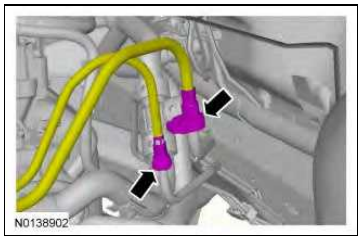


19. Refer to Section 310-00 .



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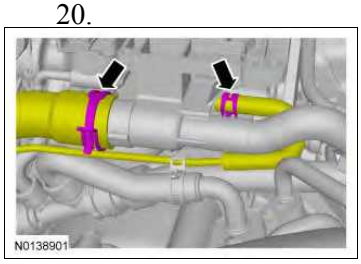
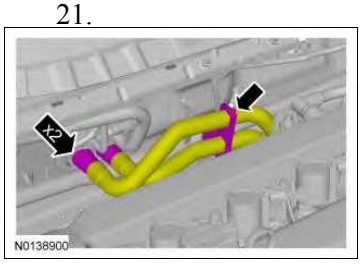


21.



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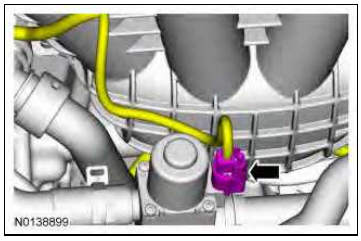
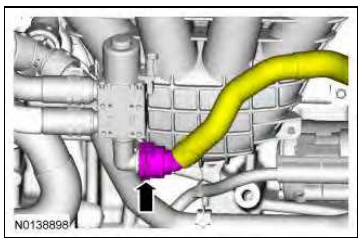


23. **NOTE:** Radiator and shroud removed for clairty.



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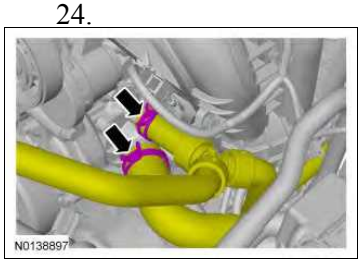
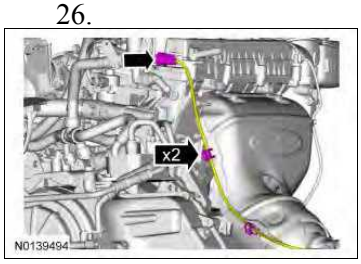
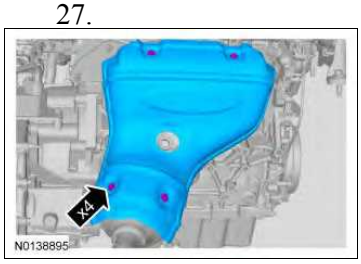


25. Remove the HO2S . Refer to Section 303-14 .

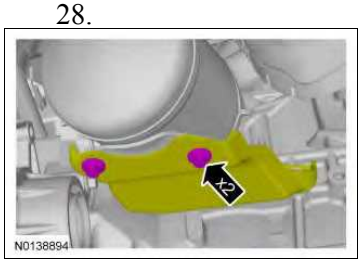
26.



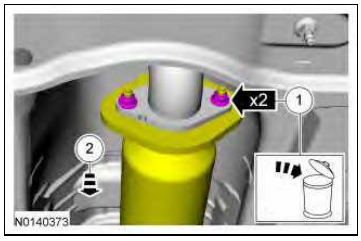
27.



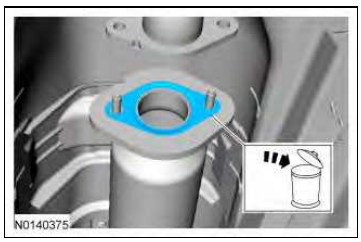
28.



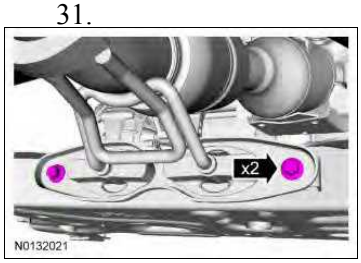
29. Discard the specified component. Follow local disposal regulations.



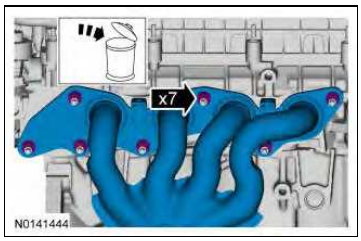
30. Discard the specified component. Follow local disposal regulations.



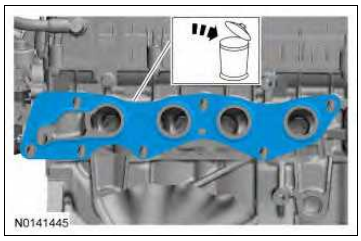
31.



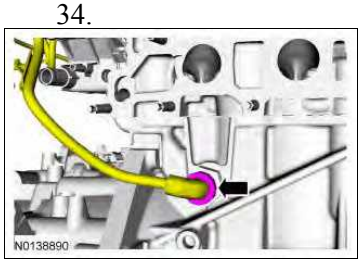
32. Discard the specified component. Follow local disposal regulations.



33. Discard the specified component. Follow local disposal regulations.



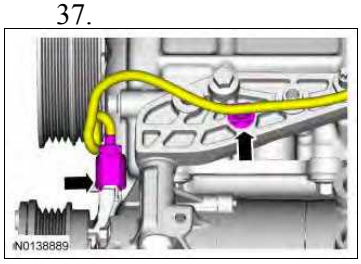
34.



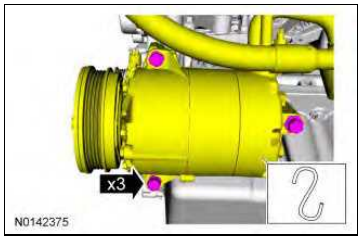
35. Remove the windshield washer bottle. Refer to Section 501-16 .

36. Remove the A/C belt and the accessory drive belt. Refer to Section 303-05 .

37.



38. Relocate and support the component.



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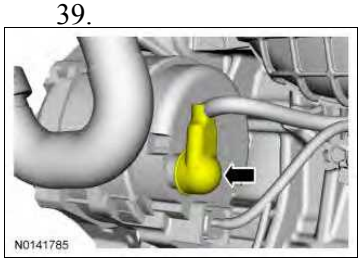

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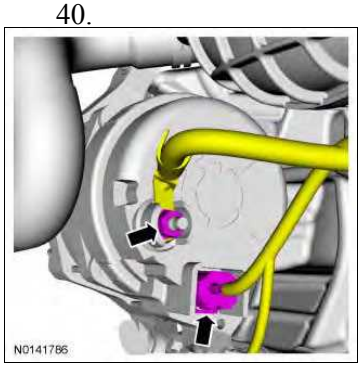
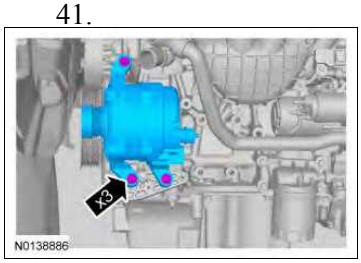


41.



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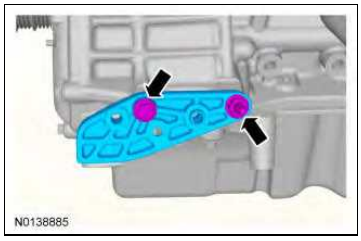
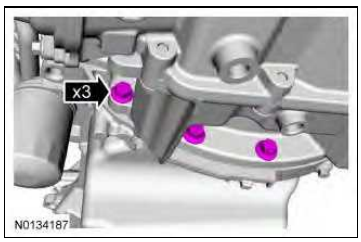
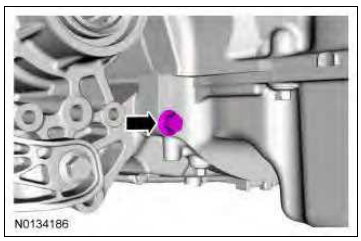


43. **NOTE:** The transaxle-to-engine bolts differ in length. Mark the bolts for correct installation.

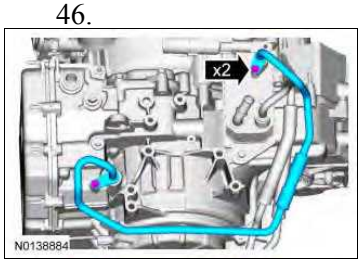


44. **NOTE:** The transaxle-to-engine bolts differ in length. Mark the bolts for correct installation.



45. Discard the specified component. Follow local disposal regulations.

46.



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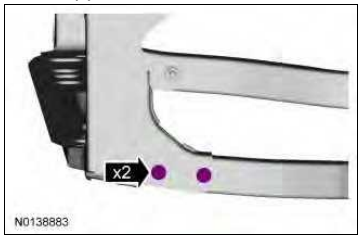

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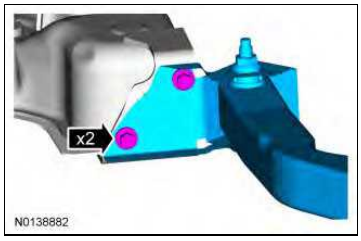
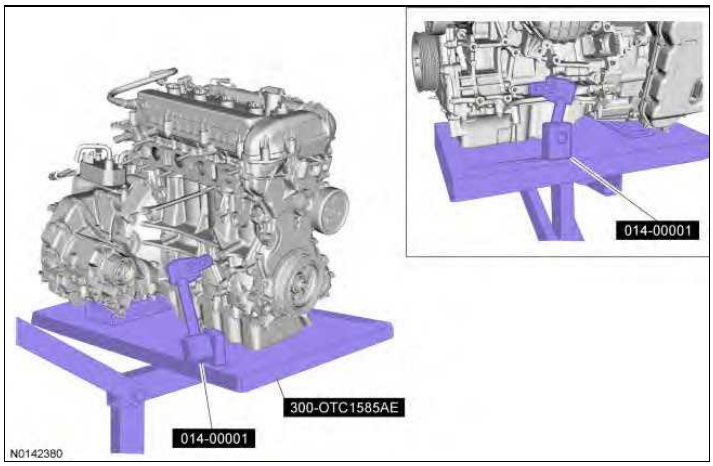


49. Install the Special Tool(s): Powertrain Lift 300-OTC1585AE or equivalent and Adjustable Grip Arm, 1735A 014-00001 or equivalent.



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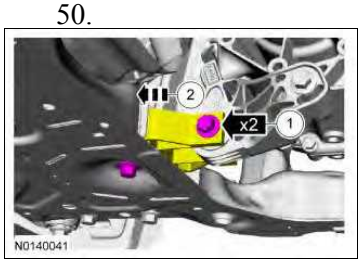

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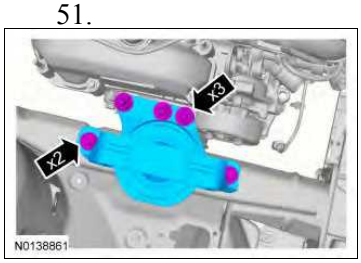

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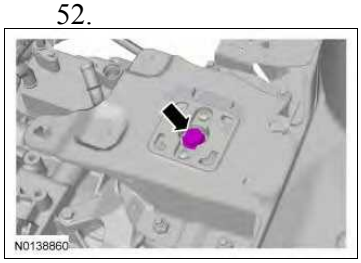
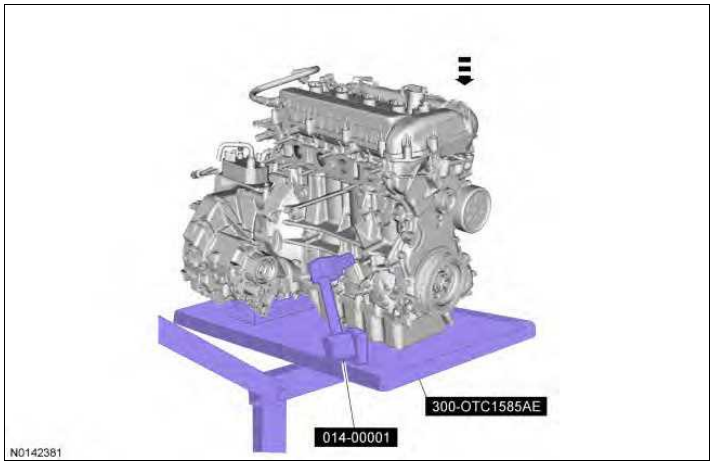
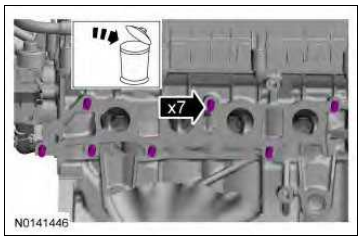


53. Special Tool(s): Powertrain Lift 300-OTC1585AE or equivalent and Adjustable Grip Arm, 1735A 014-00001 or equivalent.



54. Discard the specified component. Follow local disposal regulations.



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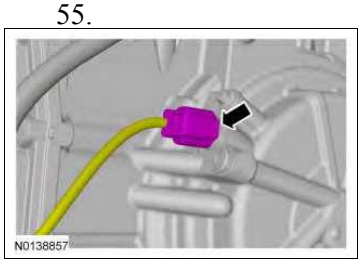

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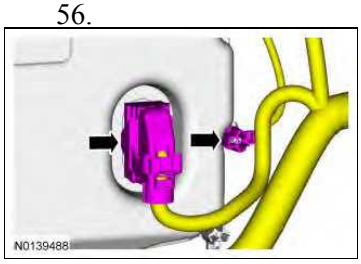

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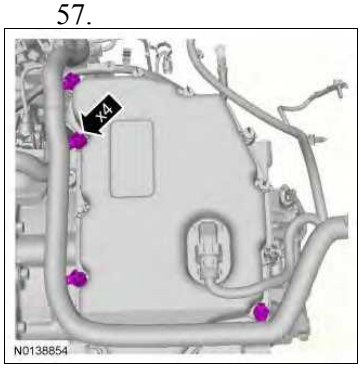

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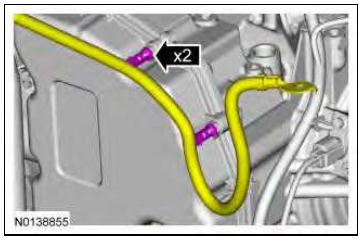

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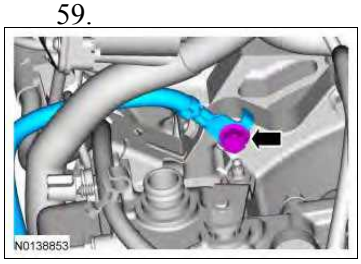

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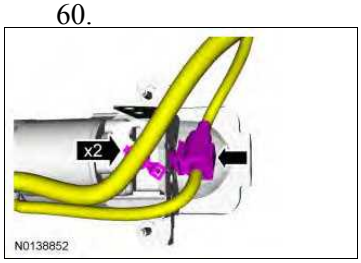

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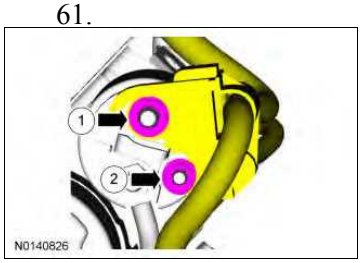

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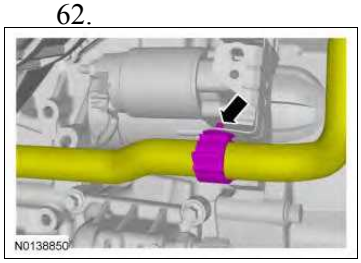

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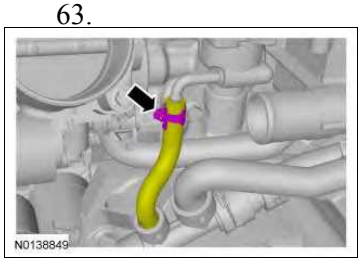

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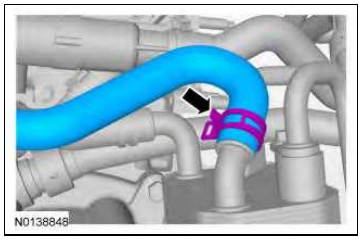

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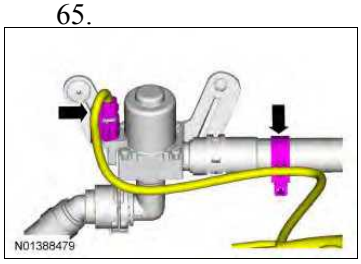

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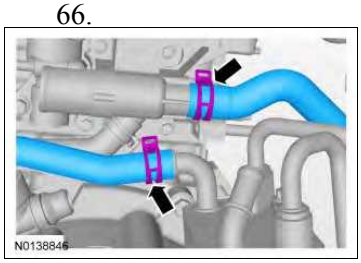

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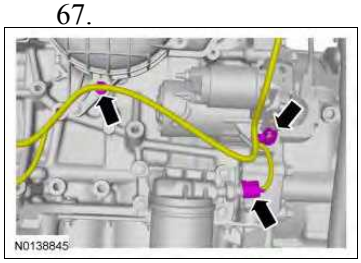

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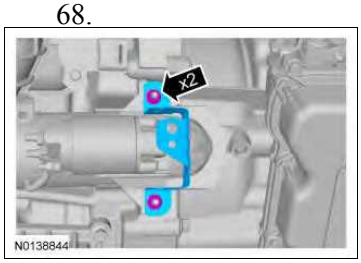

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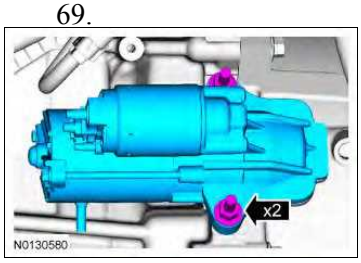

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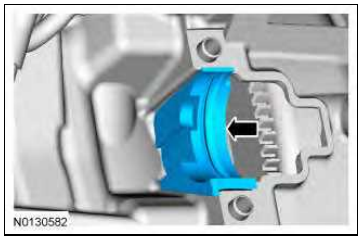
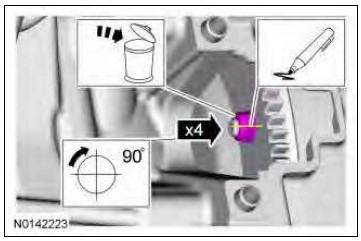
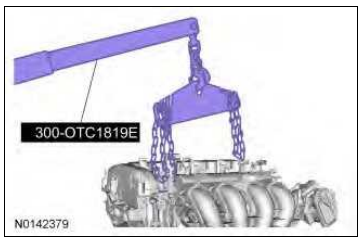


71. ***NOTICE:*** **Only rotate the engine in a clockwise direction only or engine damage will occur.**

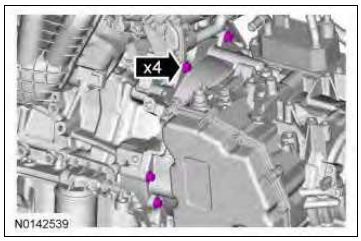
    Marker.
    Turn the component CW 90 degrees.
    Discard the specified component. Follow local disposal regulations.



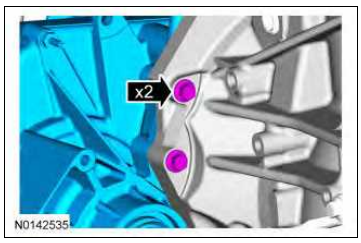
72. Install the Special Tool(s): 2,200# Floor Crane, Fold Away 300-OTC1819E or equivalent.
    General Equipment: Spreader Bar.
    Remove the engine and transaxle from the powertrain lift.



73. **NOTE:** The transaxle-to-engine bolts differ in length. Mark the bolts for correct installation.



74. **NOTE:** The transaxle-to-engine bolts differ in length. Mark the bolts for correct installation.



Engine

Special Tool(s)

 ST1326-A	Adapter for 303-224 (Handle) 205-153 (T80T-4000-W)
 ST2645-A	Alignment Plate, Camshaft 303-465 (T94P-6256-CH)
 ST3054-A	Holding Tool, Crankshaft Damper 303-1416
 ST2768-A	Holding Tool, Flywheel 303-103 (T74P-8375-A)
 ST1385-A	Remover, Oil Seal 303-409 (T92C-6700-CH)
 ST2982-A	Remover, VCT Spark Plug Tube Seal 303-1247/1
 ST2638-A	Timing Peg, Crankshaft TDC 303-507

General Equipment

Abrasive pad
Engine Stand
Holding Pin
Small Pick
Spreader Bar

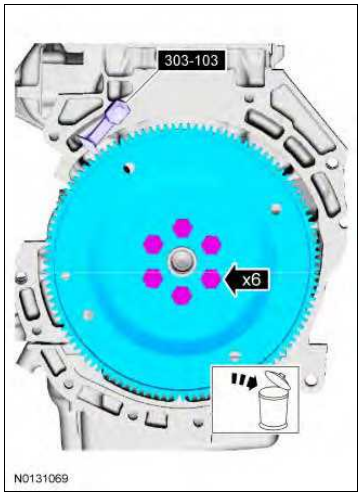
NOTICE: **Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.**

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan, can cause engine failure.**

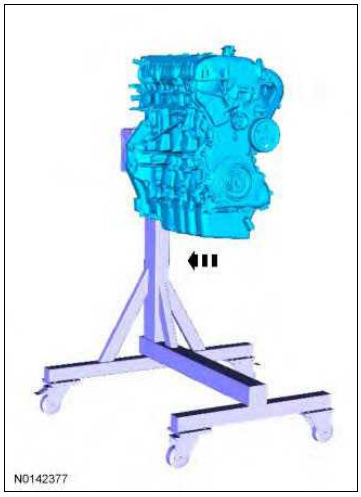
NOTE: Due to the precision construction of the balancer shaft assembly, it should not be disassembled.

NOTE: For additional information, refer to the exploded views under the Engine Assembly procedure in this section.

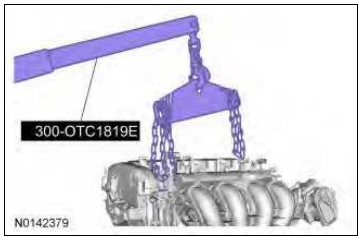
1. Discard the specified component. Follow local disposal regulations.
   Special Tool(s): Holding Tool, Flywheel 303-103.



2. General Equipment: Engine Stand.



3. Remove the Special Tool(s): 2,200# Floor Crane, Fold Away 300-OTC1819E or equivalent.
   General Equipment: Spreader Bar.



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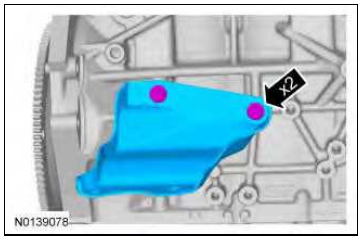

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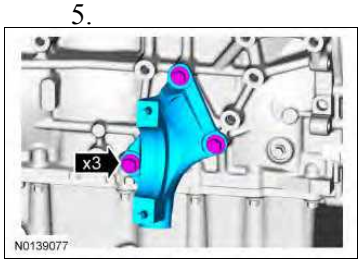

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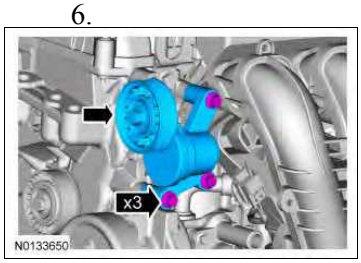

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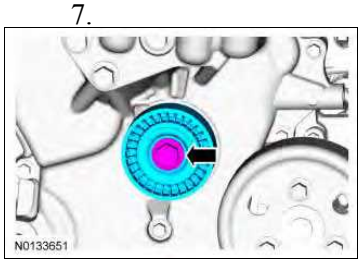

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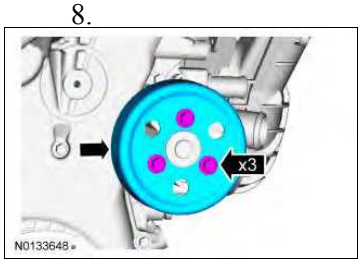

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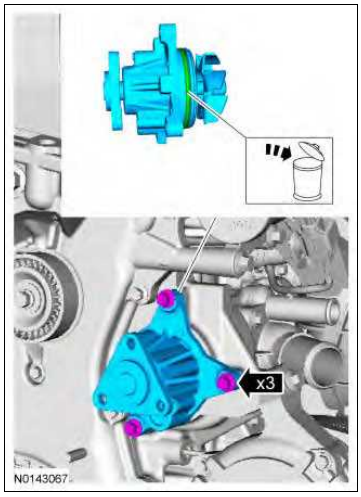

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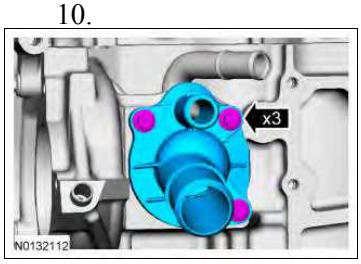
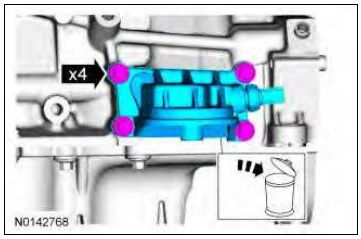
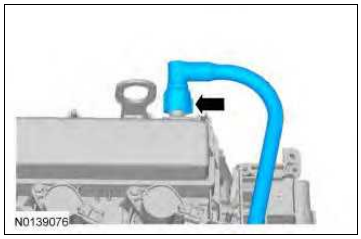


11. Discard the specified component. Follow local disposal regulations.



12. Refer to Section 310-00 .



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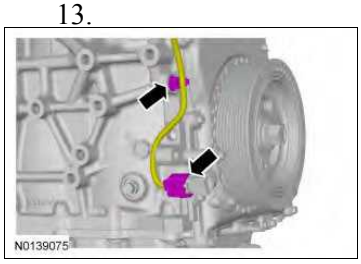

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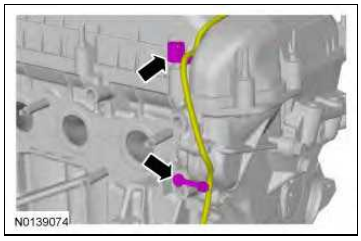

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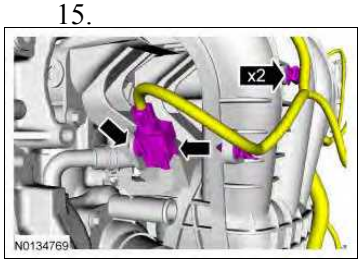

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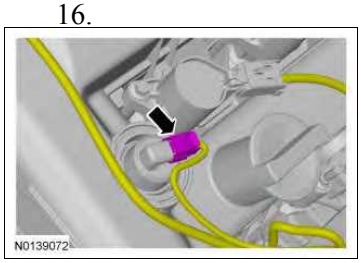

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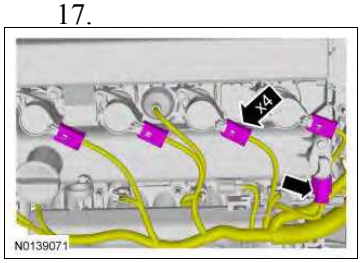

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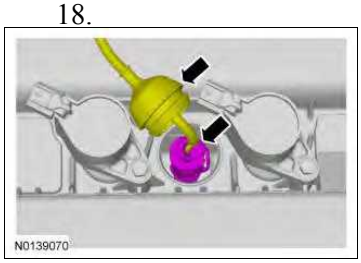

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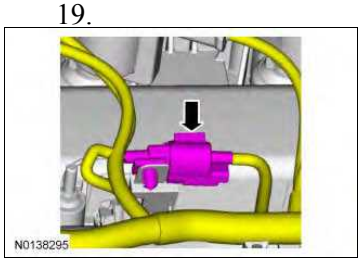

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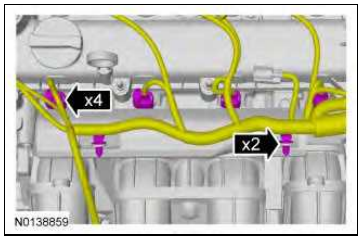

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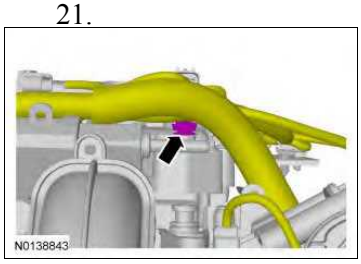

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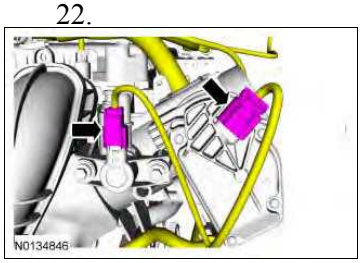

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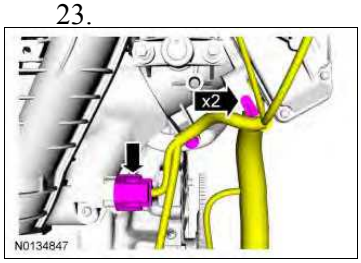

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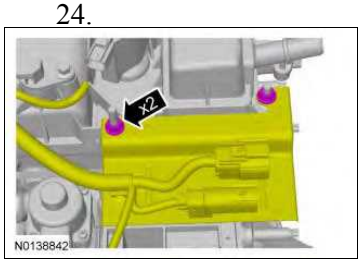

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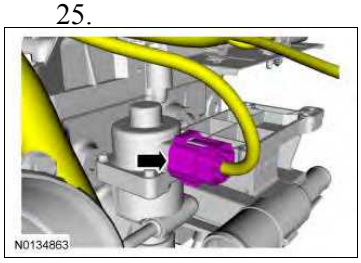

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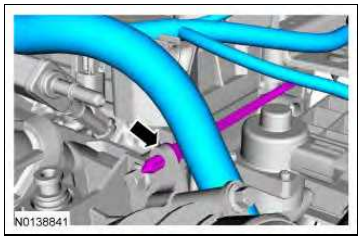
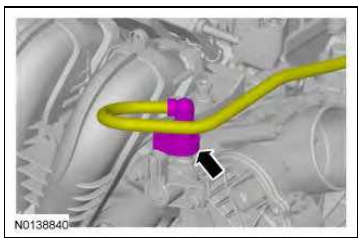


27. Refer to Section 310-00 .



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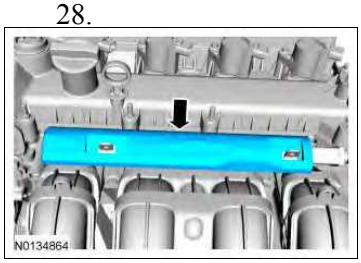
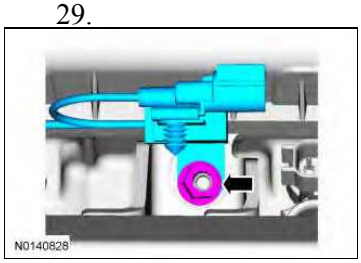


29.



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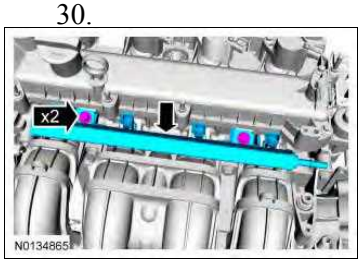
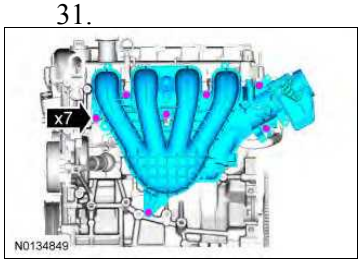


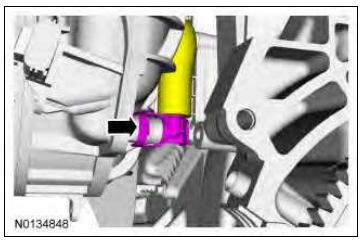
31.



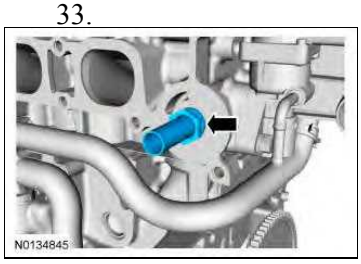
32. ***NOTICE:*** **If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine**

damage.

Squeeze the 2 crankcase vent oil separator tube tabs and disconnect the tube from the intake manifold.



33.



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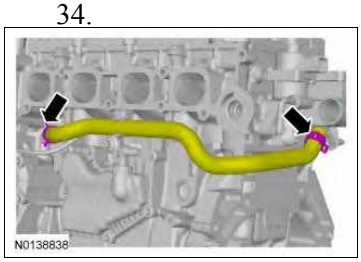

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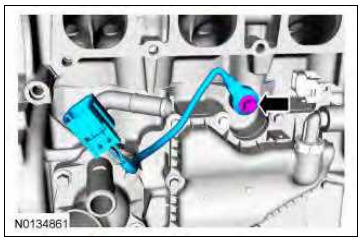

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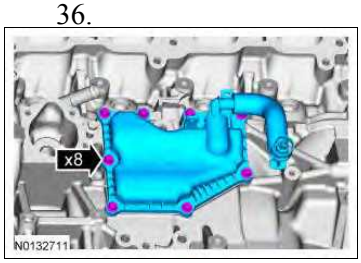
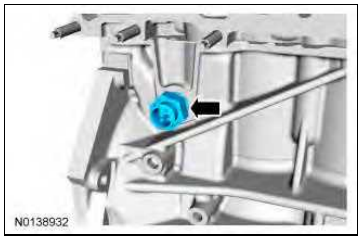
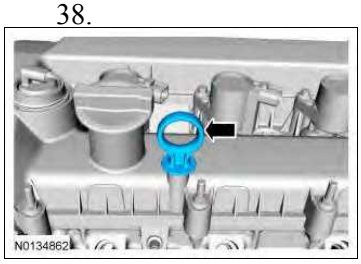


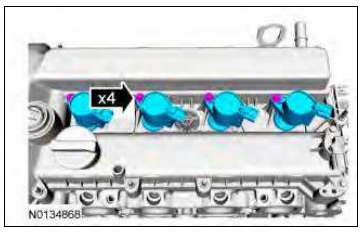
37. If equipped.



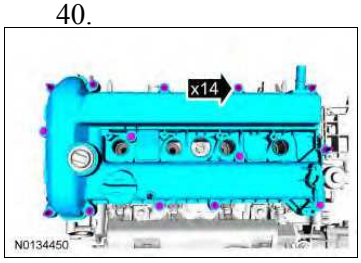
38.



39. **NOTE:** When removing the ignition coil-on-plugs, a slight twisting motion will break the seal and ease removal.

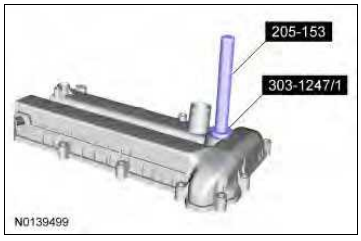


40.

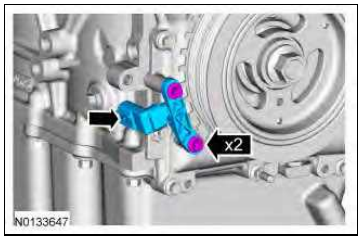


41. **NOTE:** The VCT solenoid seal should only be replaced if it is damaged.

Special Tool(s): Remover, VCT Spark Plug Tube Seal 303-1247/1 and Adapter for 303-224 (Handle) 205-153



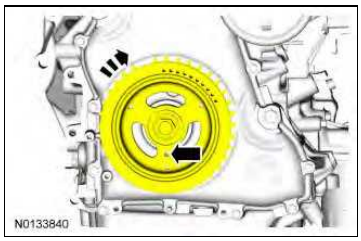
42.



43. *NOTICE:* **Failure to position the No. 1 piston at Top Dead Center (TDC) can result in damage to the engine. Turn the engine in the normal direction of rotation only.**

    Using the crankshaft pulley bolt, turn the crankshaft clockwise to position the No. 1 piston at Top Dead Center (TDC).

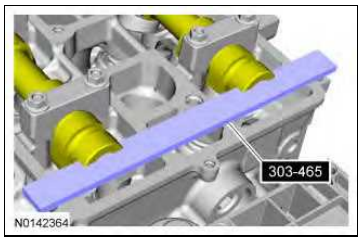
    - The hole in the crankshaft pulley should be in the 6 o'clock position.



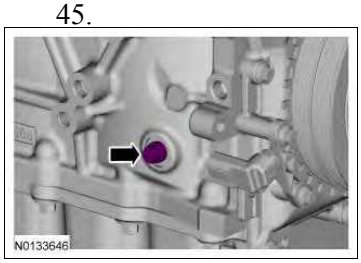
44. *NOTICE:* **The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.**

    NOTE: The camshaft timing slots are offset. If the Camshaft Alignment Plate cannot be installed, rotate the crankshaft one complete revolution clockwise to correctly position the camshafts.

    Install the Special Tool(s): Alignment Plate, Camshaft 303-465 (T94P-6256-CH).

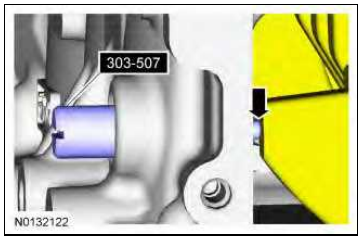


45.



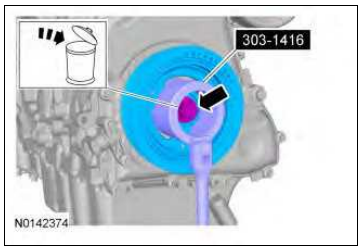
46. **NOTE:** The Crankshaft TDC Timing Peg will contact the crankshaft and prevent it from turning past TDC . However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during disassembly.

    Install the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



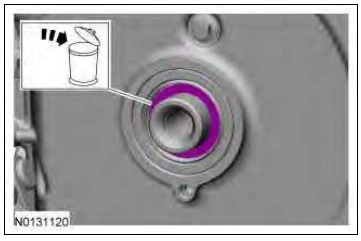
47. ***NOTICE:*** **The crankshaft must remain in the TDC position during removal of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Crankshaft Damper Holding Tool and the bolt should be removed using an air impact wrench (1/2-in drive minimum).**

    Special Tool(s): Holding Tool, Crankshaft Damper 303-1416.
    Use a suitable 1/2-in drive hand tool to hold the crankshaft pulley tool. Use an air impact wrench to remove the crankshaft pulley bolt.
    Discard the specified component. Follow local disposal regulations.



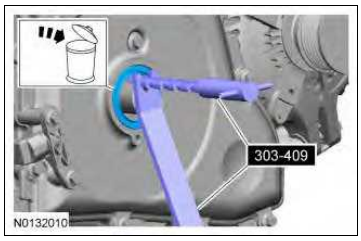
48. ***NOTICE:*** **The crankshaft sprocket diamond washer may come off with the crankshaft pulley. The diamond washer must be replaced. Remove and discard the diamond washer. If the diamond washer is not installed, engine damage may occur.**

    Discard the specified component. Follow local disposal regulations.

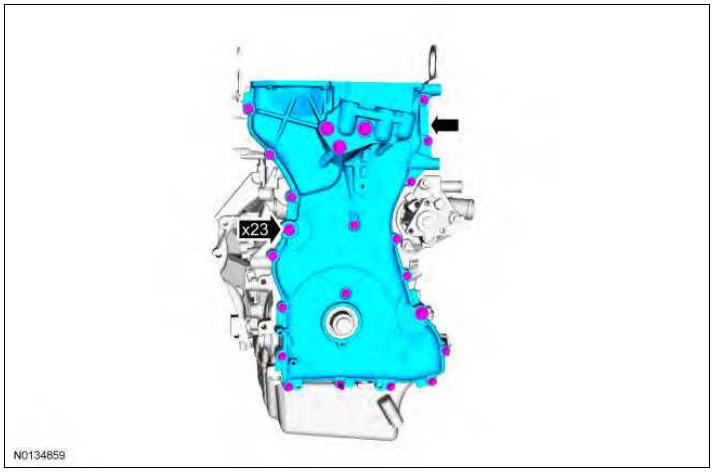


49. ***NOTICE:*** **Use care not to damage the engine front cover or the crankshaft when removing the seal.**

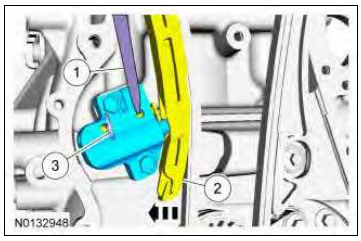
    Discard the specified component. Follow local disposal regulations.
    Special Tool(s): Remover, Oil Seal 303-409



50.

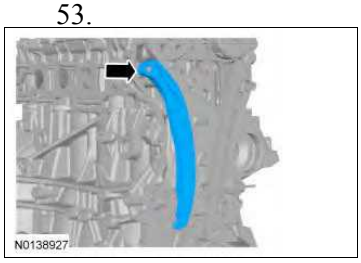


51. General Equipment: Small Pick, Holding Pin.
    1. Using a small pick, release the hold the ratchet mechanism.
    2. While holding the ratchet mechanism in the released position, compress the tensioner by pushing the timing chain arm toward the tensioner.
    3. Insert a holding pin into the hole to retain the tensioner.

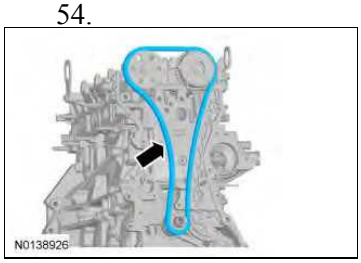


52.

53.



54.



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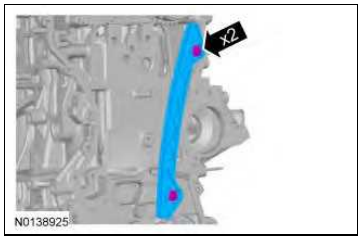
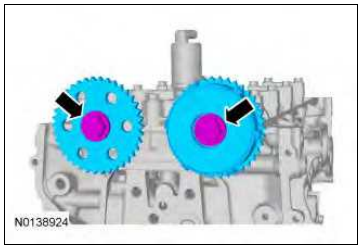
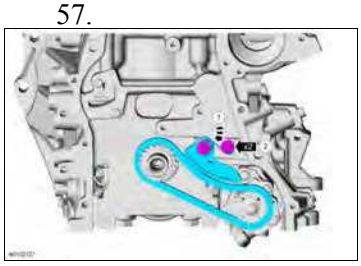


56. *NOTICE:* **The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.**

    NOTE: Using the flats on the camshaft to prevent camshaft rotation.

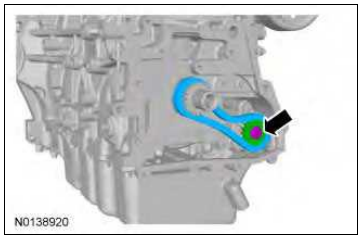


57.

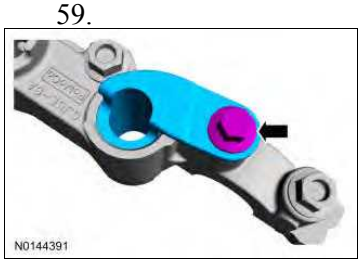


58. **NOTE:** Remove and discard the crankshaft sprocket diamond washer located behind the crankshaft sprocket.

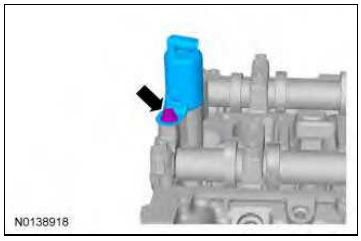
    NOTE: The oil pump chain sprocket must be held in place.



59.



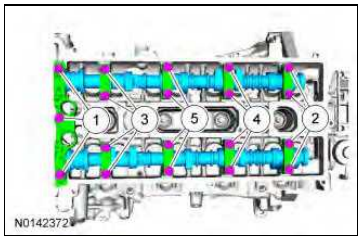
60.



61. *NOTICE:* **Failure to follow the camshaft loosening procedure can result in damage to the camshafts.**

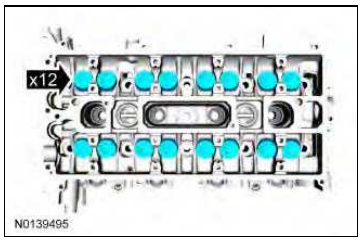
    NOTE: Mark the location and orientation of each camshaft bearing cap.

    Loosen one turn at a time. Repeat until all the tension is released.

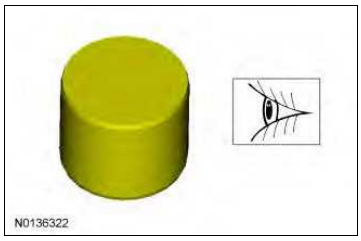


62. **NOTE:** If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.

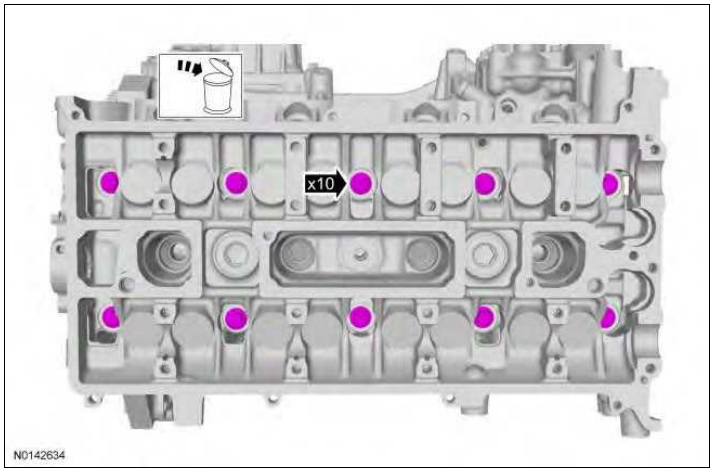
    NOTE: The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.



63. Visual check.

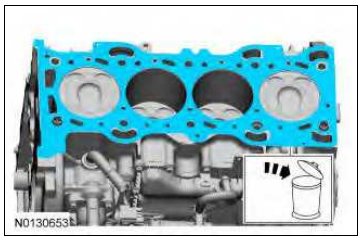


64. Discard the specified component. Follow local disposal regulations.

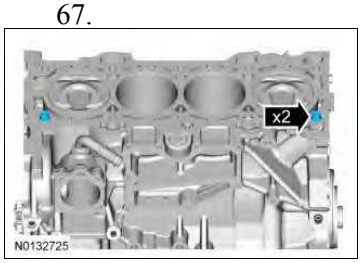


65. Support the cylinder head on a bench with the head gasket side up. Check the cylinder head distortion and the cylinder block distortion. Refer to Section 303-00 .

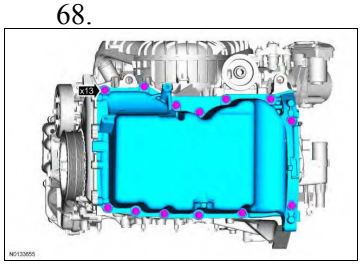
66. Discard the specified component. Follow local disposal regulations.



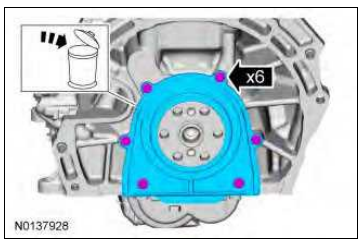
67.



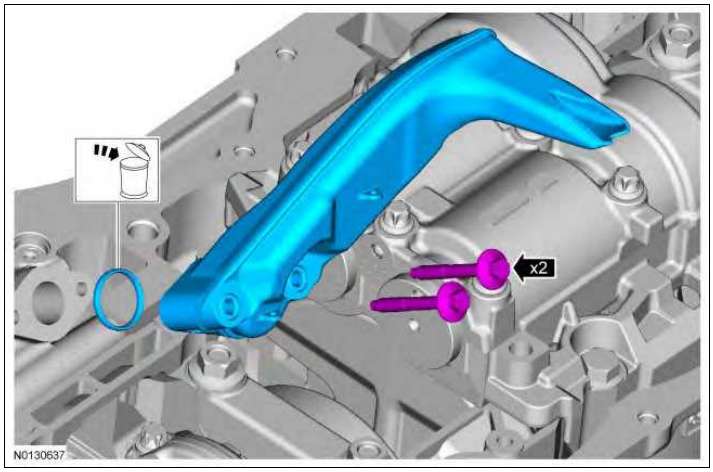
68.



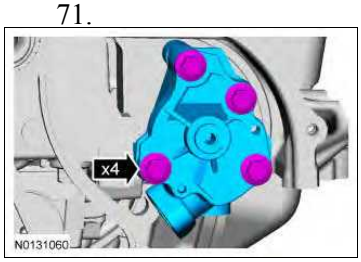
69. Discard the specified component. Follow local disposal regulations.



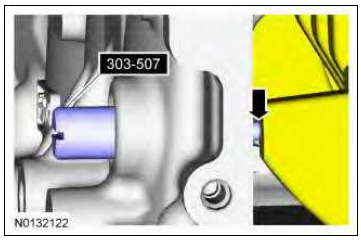
70. Discard the specified component. Follow local disposal regulations.



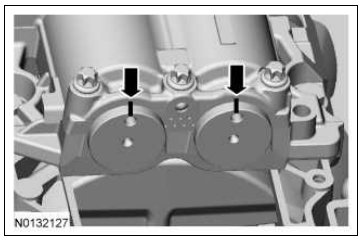
71.



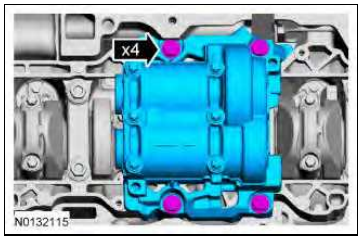
72. Install the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.
    Make sure the Crankshaft TDC Timing Peg is still installed and the engine is still at TDC .
    - Rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the Crankshaft TDC Timing Peg.



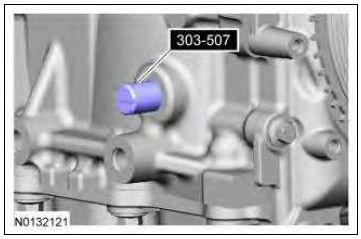
73. Mark the balancer unit front shafts on the top for reference that the balancer unit is at TDC .



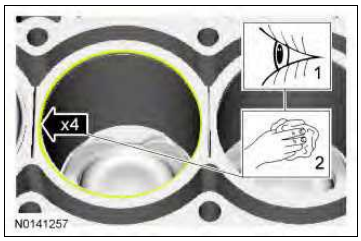
74. **NOTE:** Due to the precision interior construction of the balancer unit, it should not be disassembled.



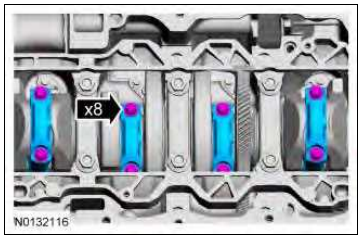
75. Remove the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



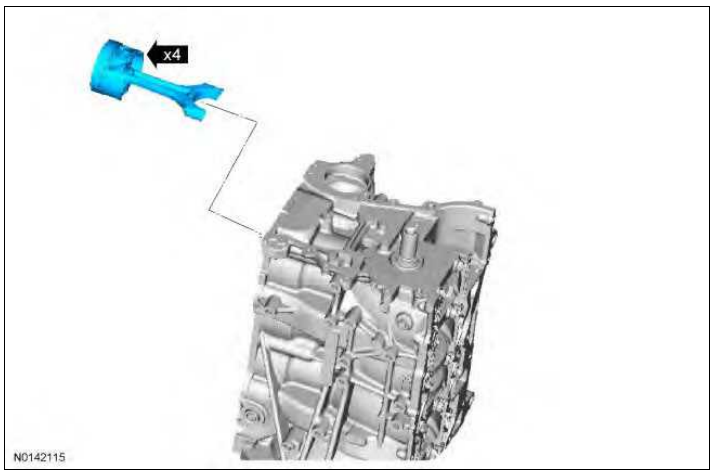
76. General Equipment: Abrasive pad.
    1. Visual check.
    2. Clean the specified component with the specified material.



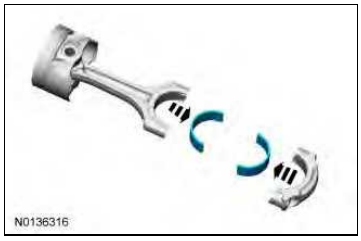
77. **NOTE:** Clearly mark the connecting rods, connecting rod caps and connecting rod bearings in numerical order for correct orientation for reassembly.



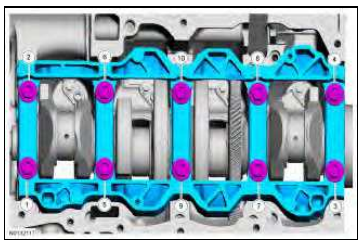
78. ***NOTICE:*** **Do not scratch the cylinder walls or crankshaft journals with the connecting rod.**



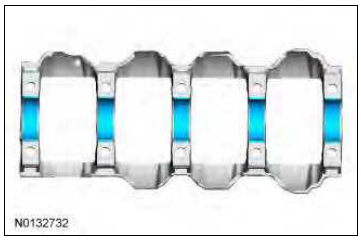
79. **NOTE:** Mark the position of the parts, so they can be installed in their original positions.



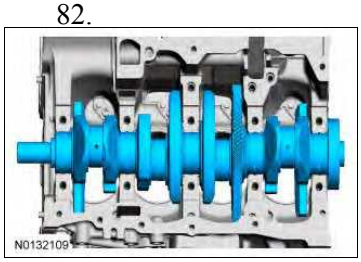
80. Remove in the sequence shown.



81. **NOTE:** If the main bearings are being reused, mark them in order for correct orientation and reassembly.



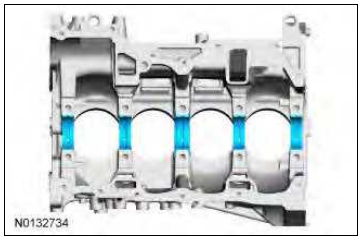
82.



83. **NOTE:** If the main bearings are being reused, mark them in order for correct orientation and reassembly.

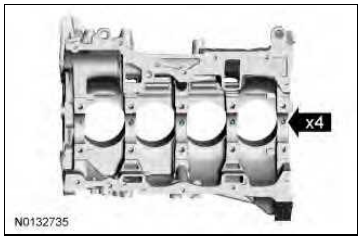
    NOTE: The center bulkhead has the thrust bearing.

    Remove the 5 main bearings from the cylinder block.



84. **NOTE:** If the oil squirters are being reused, mark them in order for correct location during reassembly.

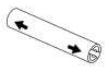
    NOTE: The front bulkhead does not have an oil squirter.



85. Inspect the cylinder block and pistons. Refer to Section 303-00 .

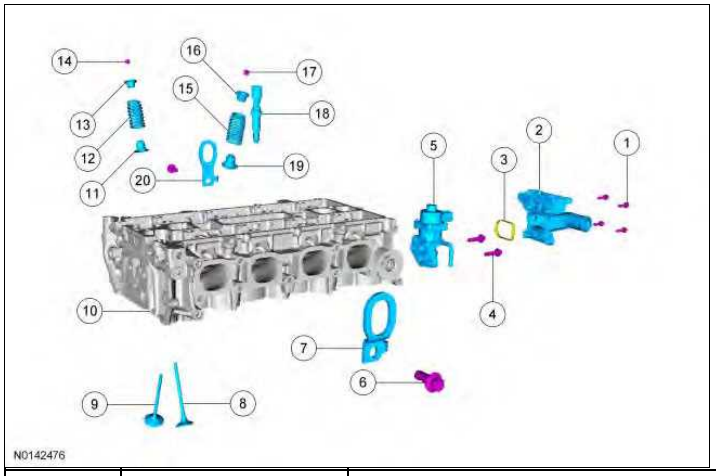
Cylinder Head

Special Tool(s)

 ST1981-A	Compressor, Valve Spring 303-300 (T87C-6565-A)
 ST1907-A	Compressor, Valve Spring 303-350 (T89P-6565-A)
 ST1902-A	Compressor, Valve Spring 303-472 (T94P-6565-AH)
 ST1906-A	Installer, Valve Stem Oil Seal 303-470 (T94P-6510-CH)
 ST1904-A	Remover, Valve Stem Oil Seal 303-468 (T94P-6510-AH)
 ST1187-A	Slide Hammer 307-005 (T59L-100-B)

Material

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B



Item	Part Number	Description
1	W500015	Coolant outlet bolt (4 required)
2	8K556	Coolant outlet
3	8255	Coolant outlet gasket
4	W500225	EGR valve bolt (2 required)
5	9D475	EGR valve
6	W500033	Engine lift eye bolt (2 required)
7	17K084	Front engine lift eye
8	6505	Exhaust valve (8 required)
9	6507	Intake valve (8 required)
10	6049	Cylinder head
11	6A517	Exhaust valve seal (8 required)
12	6513	Exhaust valve spring (8 required)
13	6514	Exhaust valve spring retainer (8 required)
14	6518	Exhaust valve collet (8 required)
15	6513	Intake valve spring (8 required)
16	6514	Intake valve spring retainer (8 required)
17	6518	Intake valve collet (8 required)
18	6G004	Cylinder Head Temperature (CHT) sensor
19	6A517	Intake valve seal (8 required)
20	17K004	Rear engine lift eye

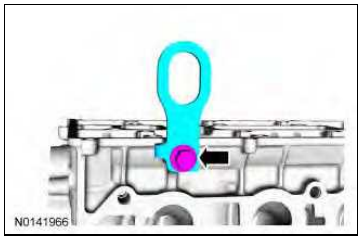
Disassembly

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material, including material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.**

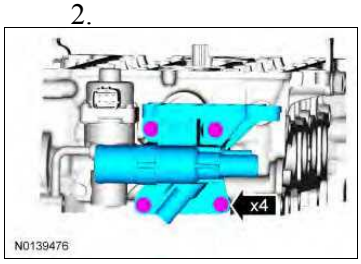
NOTICE: **Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface.**

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components removed for locations.

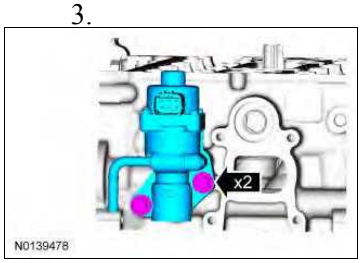
1. **NOTE:** Rear shown, front similar.



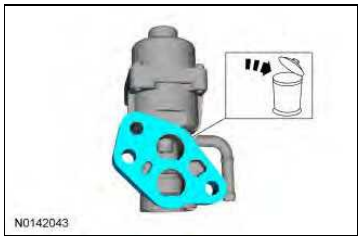
2.



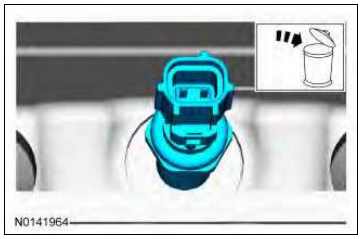
3.



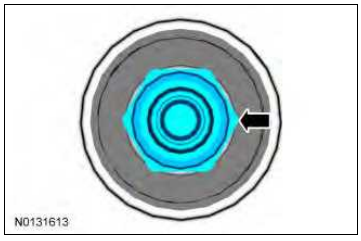
4. Discard the specified component. Follow local disposal regulations.



5. Discard the specified component. Follow local disposal regulations.

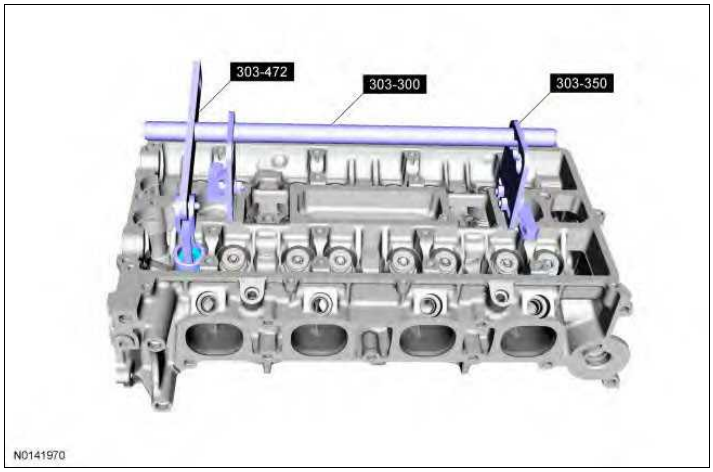


6. ***NOTICE:*** **Only use hand tools when removing or installing the spark plugs or damage can occur to the cylinder head or spark plug.**

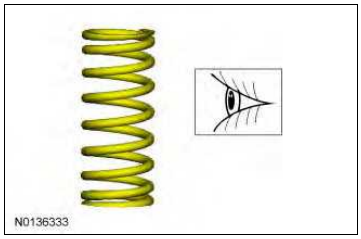


7. **NOTE:** Use a small screwdriver and multi-purpose grease to remove the valve collets.

   Remove the valve collets, valve spring retainers and the valve springs.
   Special Tool(s): Compressor, Valve Spring 303-300, Compressor, Valve Spring 303-350 and Compressor, Valve Spring 303-472.
   Material: Multi-Purpose Grease XG-4 and/or XL-5.

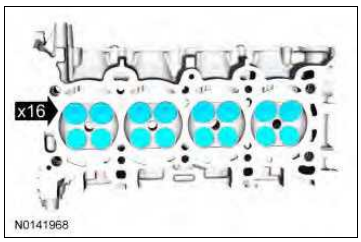


8. Visual check
   - Install new parts, as necessary.



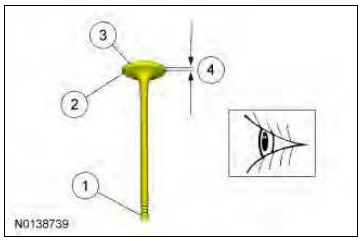
9. Discard the specified component. Follow local disposal regulations.
   Special Tool(s): Remover, Valve Stem Oil Seal 303-468, Slide Hammer 307-005.

10. **NOTE:** Note the location of the valves if they are to be reused.



11. Visual check
    Inspect the following valve areas:
    1. The end of the stem for grooves or scoring.

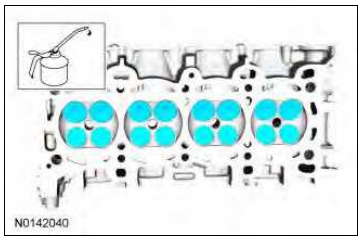
2. The valve face and the edge for pits, grooves or scores.
3. The valve head for signs of burning, erosion, warpage and cracking.
4. The valve margin for wear.
- Install new parts, as necessary.



Assembly

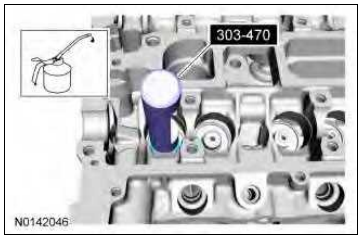
1. **NOTE:** If installing the original valves, make sure the valves are installed in the same position from which they were removed. Coat the valve stems with clean engine oil.

   Apply the specified lubricant to the specified component.
   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.



2. **NOTE:** Use the protector provided with the replacement kit to prevent damage to the valve seals.

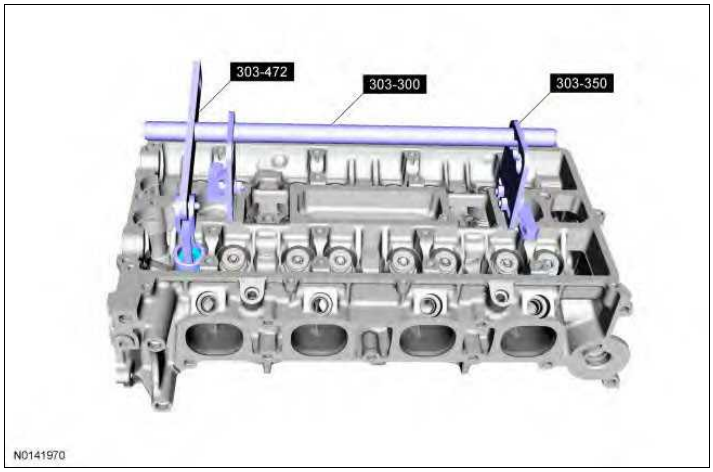
   Apply the specified lubricant to the specified component.
   Special Tool(s): Installer, Valve Stem Oil Seal 303-470.
   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.



3. **NOTE:** Check the seating of the valve collets.

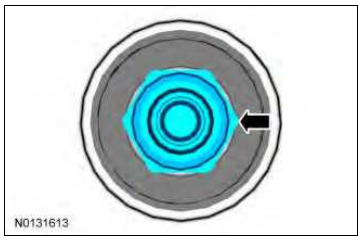
   Install the valve springs, valve spring retainers and the valve collets.
   Special Tool(s): Compressor, Valve Spring 303-300, Compressor, Valve Spring 303-350 and Compressor, Valve Spring 303-472.
   Material: Multi-Purpose Grease XG-4 and/or XL-5.

   - Compress the valve spring d install the valve collets, using multi-purpose grease and a small screwdriver.
   - Check the seating of the valve collets.

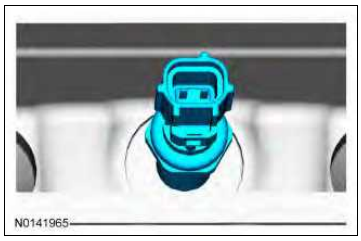


4. *NOTICE:* **Only use hand tools when removing or installing the spark plugs or damage can occur to the cylinder head or spark plug.**

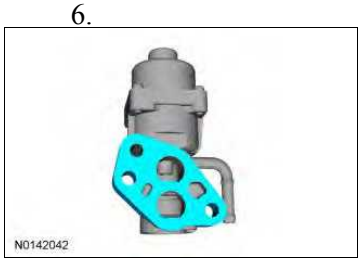
    - Tighten to 12 Nm (106 lb-in).



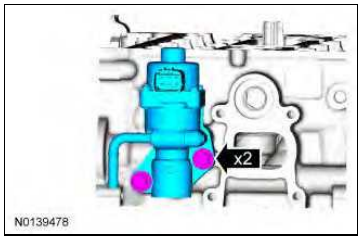
5. Tighten to 12 Nm (106 lb-in).



6.

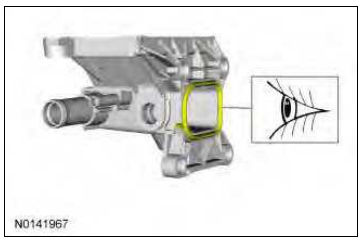


7. Tighten to 20 Nm (177 lb-in).

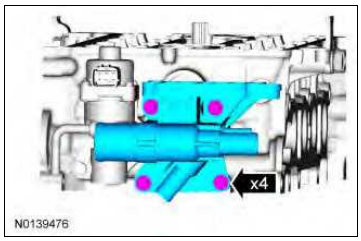


8. **NOTE:** Replace gasket if damaged.

Visual check

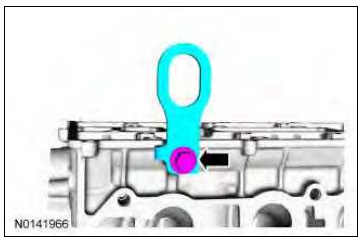


9. Tighten to 10 Nm (89 lb-in).



10. **NOTE:** Rear shown, front similar.

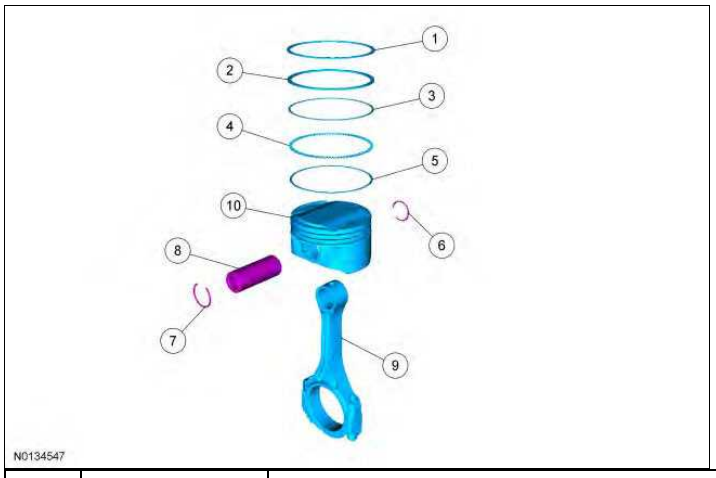
Tighten to 47 Nm (35 lb-in).



Piston

Material

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A



Item	Part Number	Description
1	-	Piston compression upper ring (part of 6148)
2	-	Piston compression lower ring (part of 6148)
3	-	Piston oil control upper segment ring (part of 6148)
4	-	Piston oil control spacer
5	-	Piston oil control lower segment ring (part of 6148)
6	6140	Piston pin retainer
7	6140	Piston pin retainer
8	6135	Piston pin
9	6200	Connecting rod
10	6110	Piston

Disassembly

1. Discard the specified components. Follow local disposal regulations.

2. Discard the specified components. Follow local disposal regulations.

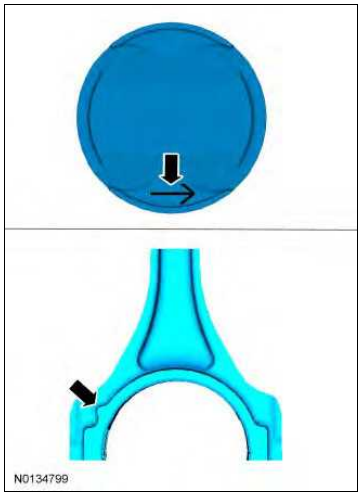
3. **NOTE:** If the piston and connecting rod are to be reinstalled, they must be assembled in the same orientation. Mark the piston orientation to the connecting rod for reassembly.

   Separate the piston from the connecting rod.

   - Clean and inspect the piston. Refer to Section 303-00 .

Assembly

1. Indicates front of engine.



2. Apply the specified lubricant to the specified component.
   Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.

3.

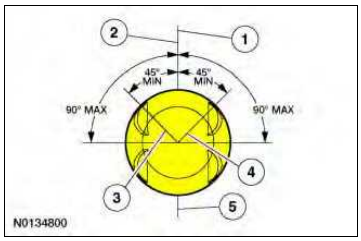
4. Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.

5. **NOTE:** The piston compression upper and lower ring should be installed with the paint mark on the outside diameter circumference of the ring to be positioned on the right side of the ring gap. The lower compression ring needs to be installed with the undercut side downward.

   NOTE: The upper and lower compression ring gaps are not controlled for installation.

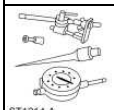
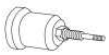
   Align the piston rings onto the piston.

   1. Center line of the piston parallel to the wrist pin bore.
   2. Upper compression ring gap location.
   3. Upper oil control ring gap location.
   4. Lower oil control ring gap location.
   5. Expander ring and lower compression ring end gap location.



Engine

Special Tool(s)

 ST1326-A	Adapter for 303-224 (Handle) 205-153 (T80T-4000-W)
 ST3055A	Aligner, Crankshaft Sensor 303-1417
 ST2645-A	Alignment Plate, Camshaft 303-465 (T94P-6256-CH)
 ST1214-A	Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C)
 ST1341-A	2,200# Floor Crane, Fold Away 300-OTC1819E or equivalent
 ST3054-A	Holding Tool, Crankshaft Damper 303-1416
 ST2768-A	Holding Tool, Flywheel 303-103 (T74P-8375-A)
 ST1917-A	Installer, Camshaft Front Oil Seal 303-096 (T74P-6150-A)
 ST1506-A	Installer, Crankshaft Rear Main Oil Seal 303-328 (T88P-6701-B1)
 ST2983-A	Installer, VCT Spark Plug Tube Seal 303-1247/2
 ST2638-A	Timing Peg, Crankshaft TDC 303-507

General Equipment

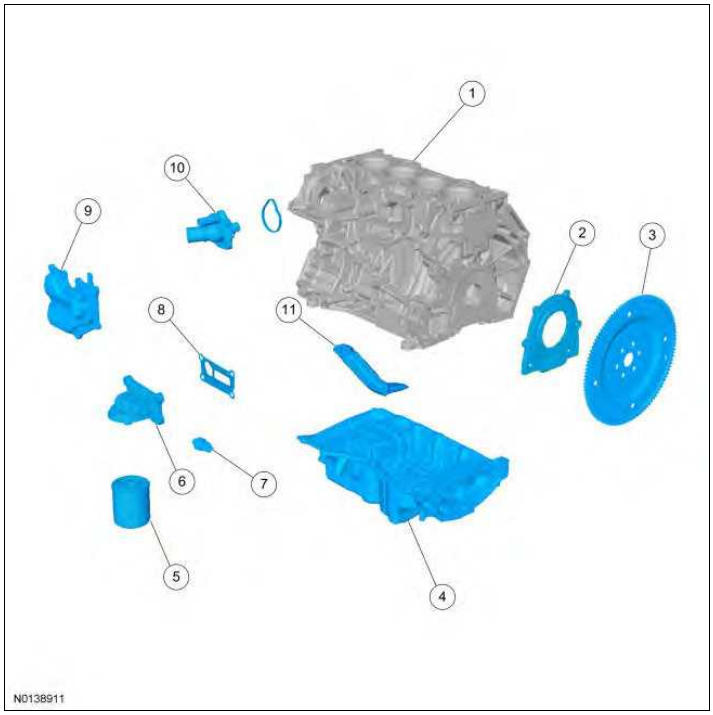
6 mm x 18 mm Bolt
Engine Stand
Holding Pin
Piston Ring Compressor
Small Pick

Spreader Bar
Straight Edge

Material

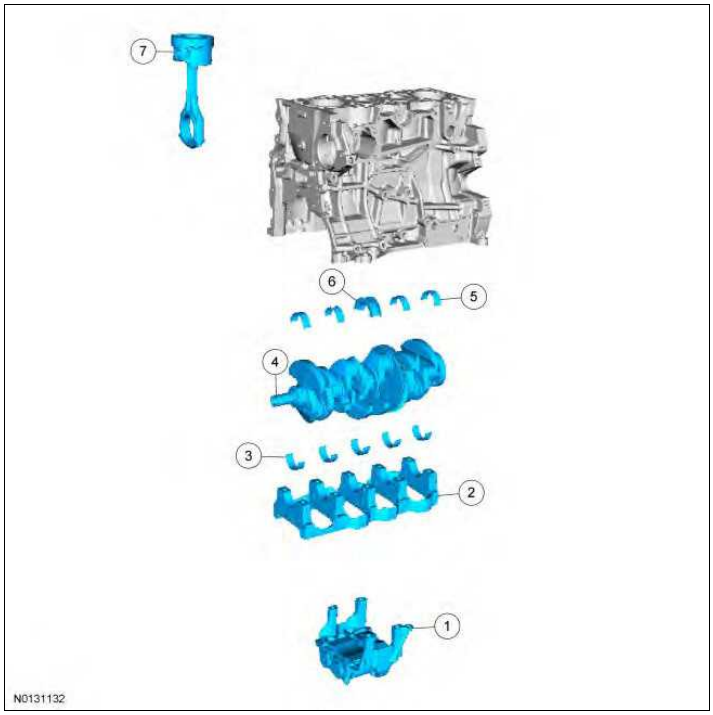
Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® Orange Antifreeze/Coolant Prediluted VC-3DIL-B (US); CVC-3DIL-B (Canada)	WSS-M97B44-D2
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Silicone Gasket Remover ZC-30	-

Lower Engine Block (View 1)



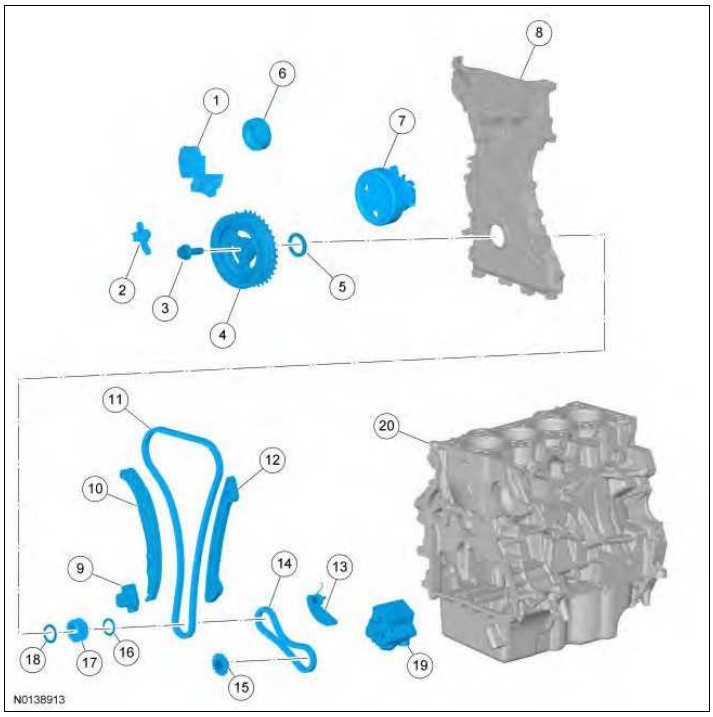
Item	Part Number	Description
1	6010	Cylinder block
2	6K318	Crankshaft rear oil seal and retainer
3	6K375	Flexplate
4	6675	Oil pan
5	6714	Oil filter
6	6884	Oil filter adapter
7	9278	Engine Oil Pressure (EOP) switch
6A636	Oil filter adapter gasket	
9	6A785	Crankcase vent oil separator
10	8575	Thermostat assembly
11	6622	Oil pump screen and pickup tube

Lower Engine Block (View 2)



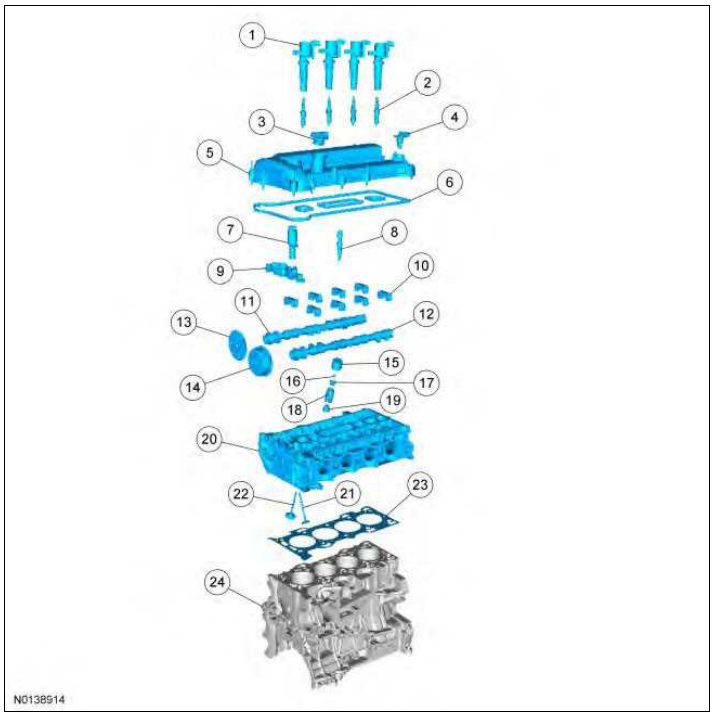
Item	Part Number	Description
1	6K360	Balance shaft assembly
2	-	Main bearing beam (part of 6010)
3	6A338	Crankshaft main bearing beam bearing (5 required)
4	6300	Crankshaft assembly
5	6333	Cylinder block crankshaft main bearing (4 required)
6	6337	Cylinder block crankshaft main thrust bearing
7	6110	Piston (4 required)

Front Engine Block



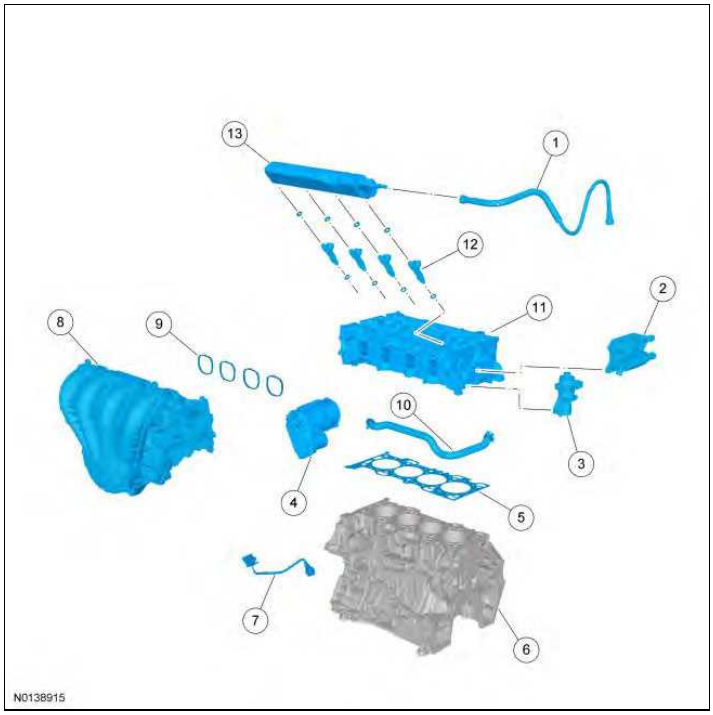
Item	Part Number	Description
1	6B209	Accessory drive belt tensioner
2	6C315	Crankshaft Position (CKP) sensor
3	6K340	Crankshaft pulley bolt
4	6316	Crankshaft pulley
5	6700	Crankshaft front seal
6	6C348	Idler pulley
7	8501	Coolant pump and pulley
8	6019	Engine front cover
9	6K254	Timing chain tensioner
10	6K255	Timing chain tensioner arm
11	6268	Timing chain
12	6K297	Timing chain guide
13	6C271	Oil pump chain tensioner
14	6A895	Oil pump chain
15	6652	Oil pump drive gear
16	6378	Diamond washer
17	6306	Crankshaft sprocket
18	6378	Diamond washer
19	6600	Oil pump
20	6010	Cylinder block

Cylinder Head



Item	Part Number	Description
1	12A366	Coil-on-plug assembly (4 required)
2	12405	Spark plug (4 required)
3	6766	Oil filler cap
4	12K073	CMP sensor
5	6M293	Valve cover
6	6K260	Valve cover gasket
7	6M280	VCT oil control solenoid
8	6G004	CHT sensor
9	-	Mega cap
10	6A284	Camshaft bearing cap (8 required)
11	6A272	Camshaft (exhaust)
12	6A271	Camshaft (intake)
13	6C251	Camshaft sprocket
14	6C525	VCT actuator
15	6500	Valve tappet (16 required)
16	6518	Valve collet (16 required)
17	6514	Valve spring retainer (16 required)
18	6513	Valve spring (16 required)
19	6A517	Valve stem seal (16 required)
20	6049	Cylinder head
21	6505	Exhaust valve (8 required)
22	6507	Intake valve (8 required)
23	6051	Head gasket
24	6010	Cylinder block

Intake Manifold



Item	Part Number	Description
1	9288	Fuel supply tube
2	8K556	Coolant outlet
3	9D475	EGR valve
4	9E926	Electronic throttle body
5	6051	Cylinder head gasket
6	6010	Cylinder block
7	12A699	Knock Sensor (KS)
8	9424	Intake manifold
9	9439	Intake manifold gasket
10	8A582	Coolant hose
11	6049	Cylinder head
12	9F593	Fuel injector (4 required)
13	9H487	Fuel rail

NOTICE: **Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage may occur.**

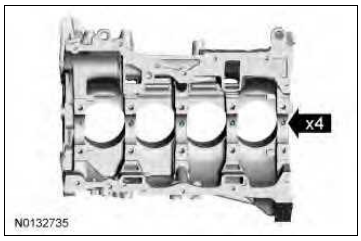
NOTICE: **During engine repair procedures, cleanliness is extremely important. All parts must be thoroughly cleaned and any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.**

NOTE: Assembly of the engine requires various inspections/measurements of the engine components (engine block, crankshaft, connecting rods, pistons and piston rings). These inspections/measurements will aid in determining if the engine components will require replacement. For additional information, refer to Section 303-00 .

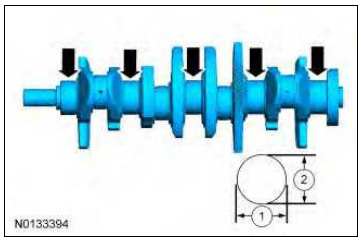
1. **NOTE:** If the oil squirters are being reused, they must be installed in the same location as marked during disassembly.

   NOTE: The front bulkhead does not have an oil squirter.

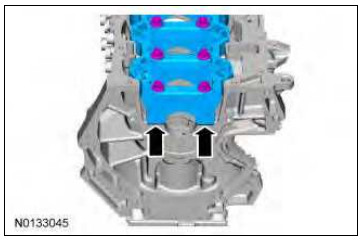
   Tighten to 4 Nm (35 lb-in).



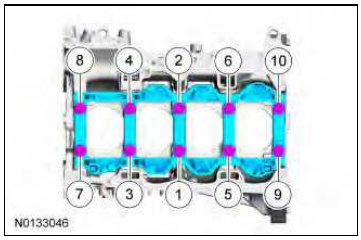
2. Measure each of the crankshaft main bearing journal diameters in at least 2 directions and record the smallest diameter for each journal.



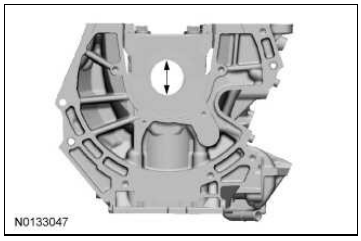
3. Position the main bearing beam in the engine block with the main bearing beam mounted flush with the rear face of the engine block and install the original main bearing beam bolts finger tight.



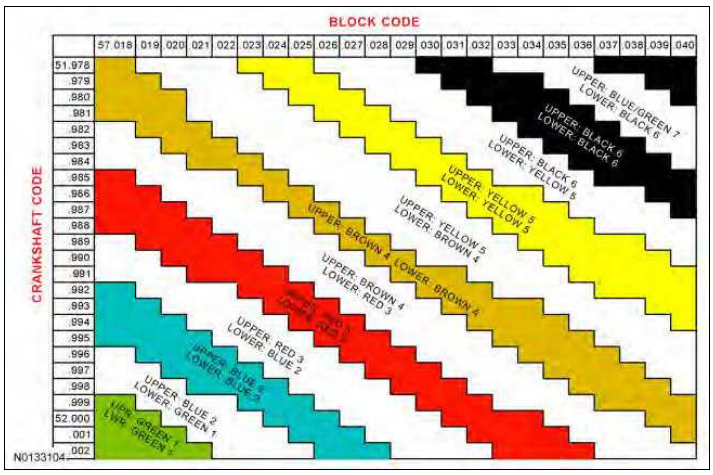
4. Tighten in the sequence shown in 3 stages.
   - Stage 1: Tighten to 5 Nm (44 lb-in).
   - Stage 2: Tighten to 25 Nm (18 lb-ft).
   - Stage 3: Tighten an additional 90 degrees.



5. Measure each crankshaft block main bearing bore diameter.



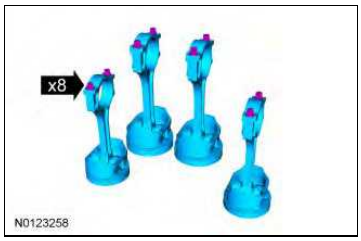
6. Using the chart, select the crankshaft main bearings.



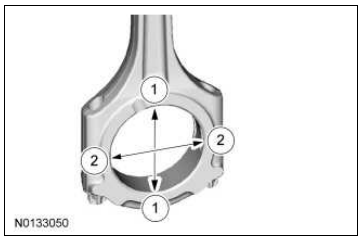
7. ***NOTICE:*** **The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.**

   Using the original connecting rod cap bolts, install the 4 connecting caps and the 8 bolts. Tighten the bolts in 3 stages.

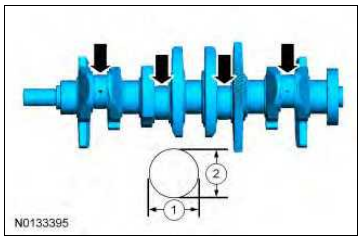
   - Stage 1: Tighten to 10 Nm (89 lb-in).
   - Stage 2: Tighten to 29 Nm (21 lb-ft).
   - Stage 3: Tighten an additional 90 degrees.



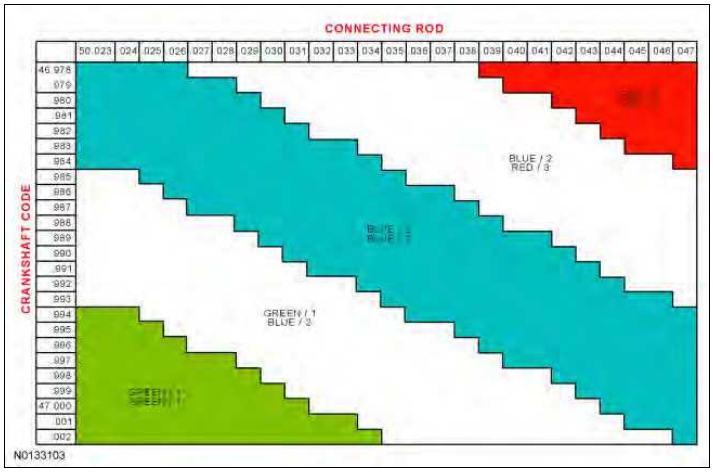
8. Measure the connecting rod large end bore in 2 directions. Record the smallest measurement for each connecting rod.
   - Remove the bolts and the connecting rod cap.
   - Discard the connecting rod cap bolts.



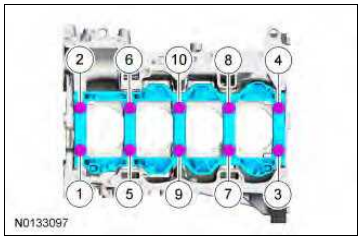
9. Measure each of the crankshaft connecting rod bearing journal diameters in at least 2 directions. Record the smallest measurement for each connecting rod journal.



10. Using the chart, select the correct connecting rod bearings for each crankshaft connecting rod journal.



11. Remove the 10 bolts in the sequence shown and the main bearing beam.
    - Discard the main bearing beam bolts.

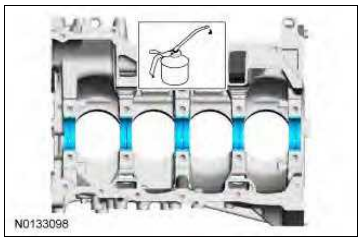


12. **NOTE:** Before assembling the cylinder block, all sealing surfaces must be free of chips, dirt, paint and foreign material. Also, make sure the coolant and oil passages are clear.

    NOTE: If reusing the crankshaft main bearings, install them in their original positions and orientation as noted during disassembly.

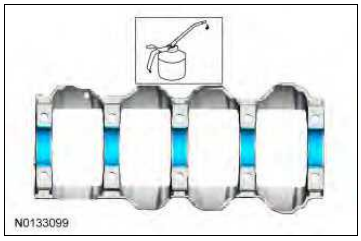
    NOTE: The center bulkhead is the thrust bearing.

    Apply the specified lubricant to the specified component.
    Material: Motorcraft® SAE 5W-20 Super Premium Motor Oil.



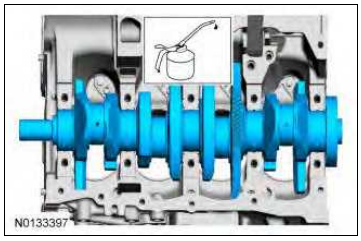
13. **NOTE:** If reusing the crankshaft main bearings, install them in their original positions and orientation as noted during disassembly.

    Apply the specified lubricant to the specified component.
    Material: Motorcraft® SAE 5W-20 Super Premium Motor Oil.

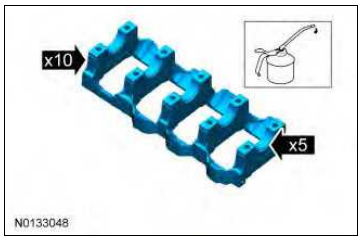


14. **NOTE:** Lubricate the journals on the crankshaft with clean engine oil.

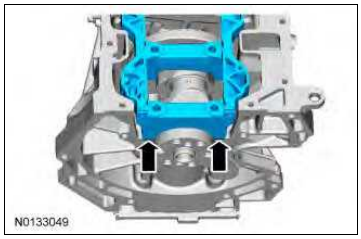
    Apply the specified lubricant to the specified component.
    Material: Motorcraft® SAE 5W-20 Super mium Motor Oil.



15. Apply the specified lubricant to the specified component.
    Material: Motorcraft® SAE 5W-20 Super Premium Motor Oil.



16. Mounted flush.

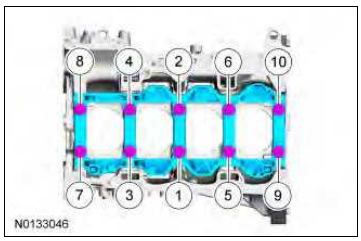


17. **NOTE:** Lubricate the main bearing beam bolts threads and under the bolt heads with clean engine oil.

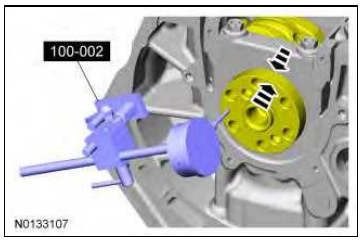
    NOTE: Position the crankshaft to the rear of the cylinder block, then position the crankshaft to the front of the cylinder block before tightening the main bearing beam bolts.

    Install and tighten the 10 new main bearing beam bolts. Tighten the bolts in the sequence shown in 3 stages.

- Stage 1: Tighten to 5 Nm (44 lb-in).
- Stage 2: Tighten to 25 Nm (18 lb-ft).
- Stage 3: Tighten an additional 90 degrees.

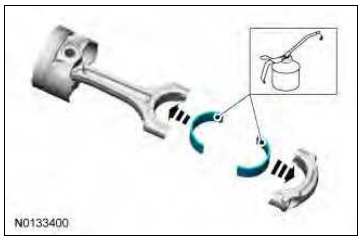


18. Special Tool(s): Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C).
    - Position the crankshaft to the rear of the cylinder block.
    - Zero the Dial Indicator Gauge with Holding Fixture.
    - Move the crankshaft to the front of the cylinder block. Note and record the crankshaft end play.
    - Acceptable crankshaft end play is 0.22-0.43 mm (0.008-0.016 in). If the crankshaft end play exceeds the specified range, install new parts as necessary.

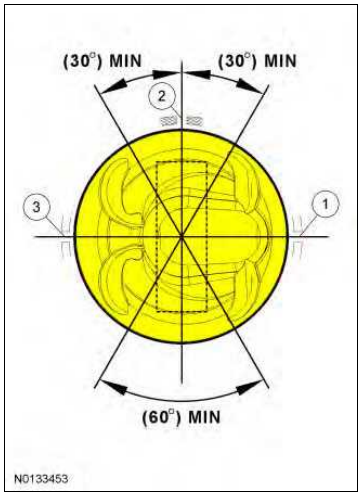


19. **NOTE:** If reusing the connecting rod bearings, install them in their original positions and orientation as noted during disassembly.

    Apply the specified lubricant to the specified component.
    Material: Motorcraft® SAE 5W-20 Super Premium Motor Oil.



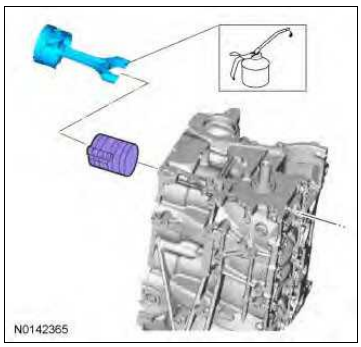
20.



21. *NOTICE:* **Be sure not to scratch the cylinder wall or crankshaft journal with the connecting rod. Push the piston down until the connecting rod bearing seats on the crankshaft journal.**

    NOTE: Make sure the piston arrow on top is facing toward the front of the engine.

    Apply the specified lubricant to the specified component.
    Material: Motorcraft® SAE 5W-20 Super Premium Motor Oil.
    General Equipment: Piston Ring Compressor.



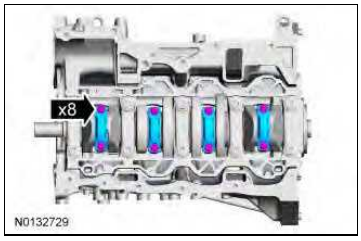
22. *NOTICE:* **The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.**

    NOTE: Install connecting rod caps and bolts on the connecting rods for cylinders 1 and 4 first and tighten. Then rotate crankshaft 180 degrees and install connecting rod caps and bolts on connecting rods for cylinders 2 and 3 and tighten.

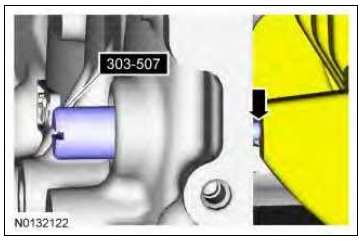
    NOTE: After installation of each connecting rod cap, rotate the crankshaft to verify smooth operation.

    Tighten to:

    - Stage 1: Tighten to 10 Nm (89 lb-in).
    - Stage 2: Tighten to 29 Nm (21 lb-ft).
    - Stage 3: Tighten an additional 90 degrees.



23. Special Tool(s): Timing Peg, Crankshaft TDC 303-507.
    - Rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the Crankshaft TDC Timing Peg. The engine is now at TDC .



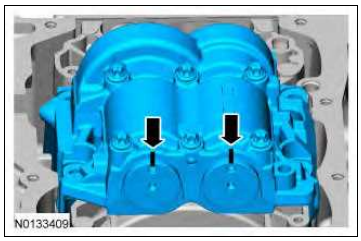
24. **NOTE:** Due to the precision interior construction of the balancer unit, it should not be disassembled.

    NOTE: The original adjustment shims must be installed in their original positions.

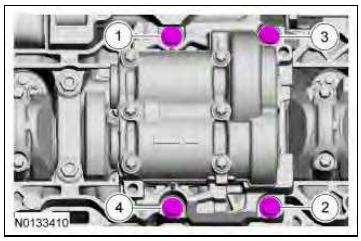
    NOTE: Confirm by visual inspection that there is no damage to the balancer unit gear and verify that the shaft turns smoothly. If there is any damage or malfunction, replace the balancer unit.

    Install the adjustment shims in their original positions on the seat faces of the balancer unit.

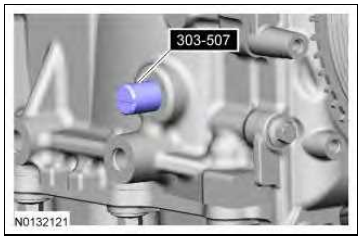
    - With the balancer unit shaft marks in the TDC position, slowly install the balancer unit to the cylinder block to avoid interference between the crankshaft drive gear and the balancer unit driven gear.



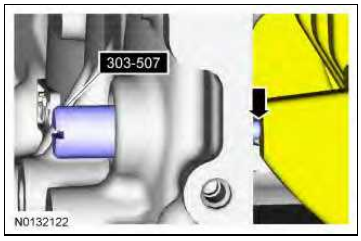
25. Tighten to:
    - Stage 1: Tighten to 25 Nm (18 lb-ft).
    - Stage 2: Tighten to 52 Nm (38 lb-ft).



26. Remove the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.
    - Rotate the crankshaft to confirm that there are no meshing problems between the balancer unit gear and the crankshaft gear.



27. Install the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.
    - Rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the Crankshaft TDC Timing Peg.
    - Remove the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



28. **NOTE:** Measure the backlash and verify that it is within specified range at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees. It will be necessary to reset the measuring equipment between measurements.

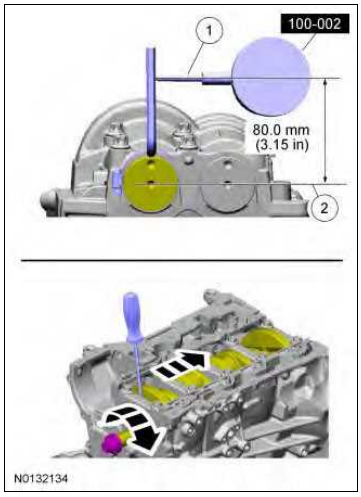
    NOTE: The measurement must be taken with the Dial Indicator Gauge with Holding Fixture, a 5-mm Allen wrench and worm clamp set up as shown. Mark the Allen wrench with a file 80 mm (3.149 in) above the driven gear shaft center. Make sure the worm clamp and Allen wrench are not touching the balance shaft housing.

    NOTE: For an accurate measurement while measuring the gear backlash, insert a screwdriver as shown into the crankshaft No. 1 crankweight area and set both the rotation and the thrust direction with the screwdriver, using a prying action as shown.

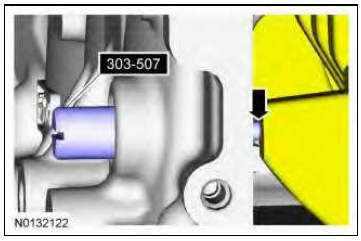
    NOTE: Position the Dial Indicator Gauge with Holding Fixture as shown. Measure the gear backlash.

    Special Tool(s): Dial Indicator Gauge with Holding Fixture 100-002 (TOOL-4201-C).

    - Position the Dial Indicator Gauge with Holding Fixture (1) on the Allen wrench 80 mm (3.149 in) above the driven gear shaft center (2) on the balancer unit.
    - Rotate the crankshaft clockwise and measure the backlash at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees.
    - Backlash specifications are 0.005 to 0.101 mm (0.00019 to 0.0039 in).
    - If the backlash exceeds the specified range, carry out the Balance Shaft Backlash procedure. Refer to Balance Shaft Backlash in this section.



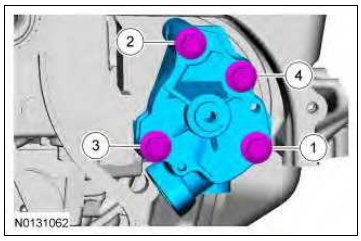
29. Install the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.
    Rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the TDC Timing Peg. The engine is now at TDC and must remain at the TDC position until the timing drive components and crankshaft pulley are installed.



30. **NOTE:** Clean the oil pump and cylinder block mating surfaces with Motorcraft® Metal Surface Prep.

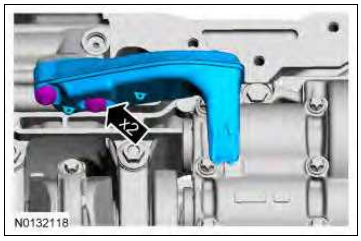
    Tighten to:

    - Stage 1: Tighten to 10 Nm (89 lb-in).
    - Stage 2: Tighten to 20 Nm (177 lb-in).



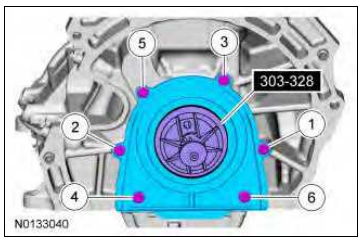
31. **NOTE:** A new gasket must be installed.

    - Tighten to 10 Nm (89 lb-in).



32. Special Tool(s): Installer, Crankshaft Rear Main Oil Seal 303-328 (T88P-6701-B1).

- Tighten to 10 Nm (89 lb-in).

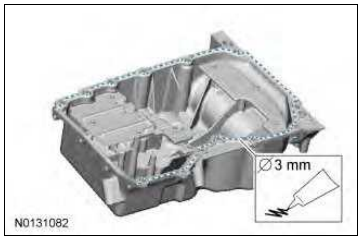


33. *NOTICE:* **Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.**

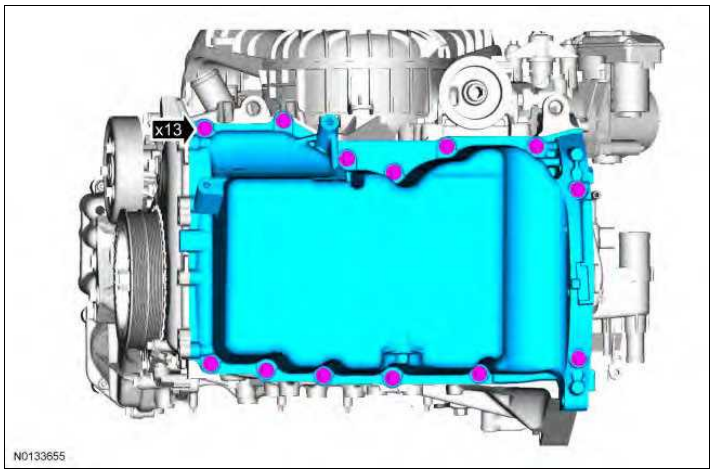
    Clean and inspect all mating surfaces.

34. **NOTE:** If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned with metal surface prep. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

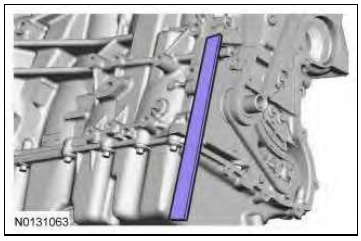
    Apply a continuous bead of the specified diameter from the specified tube.
    Material: Silicone Gasket and Sealant TA-30.



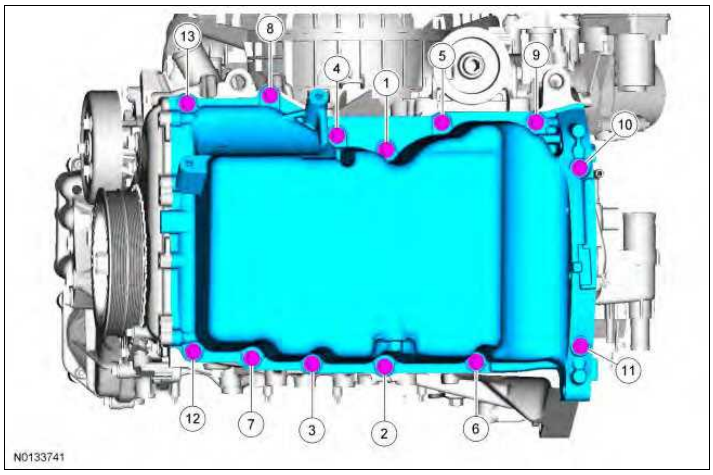
35. Tighten finger-tight.



36. General Equipment: Straight Edge.



37. Tighten in the sequence shown.
    - Tighten to 20 Nm (177 lb-in).



38. *NOTICE:* **Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.**

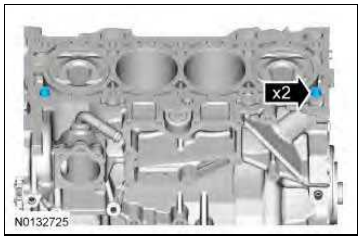
    NOTE: Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.

    NOTE: If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.

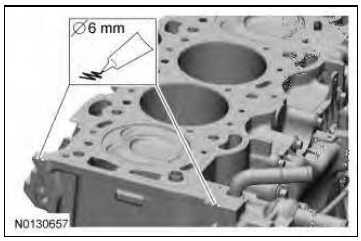
    Clean the cylinder head-to-cylinder block mating surface of both the cylinder head and the cylinder block in the following sequence.

    1. Remove any large deposits of silicone or gasket material with a plastic scraper.
    2. Apply silicone gasket remover, following package directions, and allow to set for several minutes.
    3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
    4. Apply metal surface prep, following package directions, to remove any traces of oil or coolant, and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.

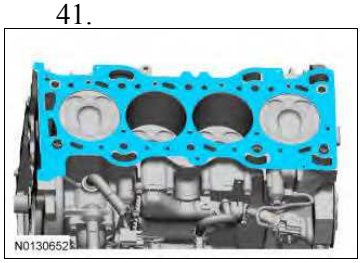
39. Dowels must be fully seated in the cylinder block.



40. Apply a continuous bead of the specified diameter from the specified tube.
    Material: Silicone Gasket and Sealant TA-30.



41.

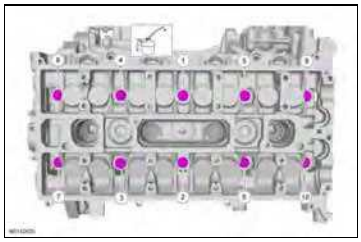


42. **NOTE:** The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed.

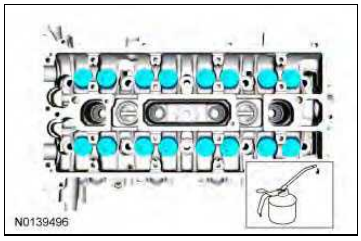
    NOTE: Lubricate the bolts with clean engine oil prior to installation.

    Apply the specified lubricant to the specified component.
    Material: Motorcraft® SAE 5W-20 Super Premium Motor Oil.
    Tighten to:

    - Stage 1: Tighten to 7 Nm (62 lb-in).
    - Stage 2: Tighten to 15 Nm (133 lb-in).
    - Stage 3: Tighten to 45 Nm (33 lb-ft).
    - Stage 4: Turn 90 degrees.
    - Stage 5: Turn an additional 90 degrees.

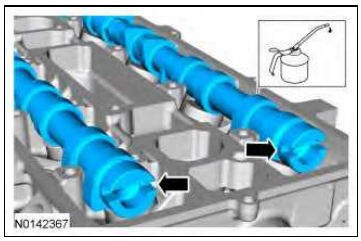


43. Apply the specified lubricant to the specified component.
    Material: Motorcraft® SAE 5W-20 Super Premium Motor Oil.

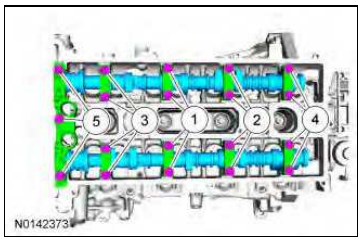


- ***NOTICE:*** **Install the camshafts with the alignment slots in the camshafts lined up so the Camshaft Alignment Plate can be installed without rotating the camshafts. Make sure the lobes on the No. 1 cylinder are in the same position as noted in the disassembly procedure. Rotating the camshafts when the timing chain is removed, or installing the camshafts 180 degrees out of position, can cause severe damage to the valves and pistons.**

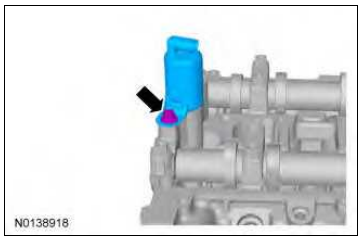
  Apply the specified lubricant to the specified component.
  Material: Motorcraft® SAE 5W-20 Super Premium Motor Oil.



45. Tighten to:
    - Stage 1: Tighten the camshaft bearing cap bolts one at a time until finger-tight.
    - Stage 2: Tighten to 7 Nm (62 lb-in).
    - Stage 3: Tighten to 16 Nm (142 lb-in).



46. - Tighten to 11 Nm (97 lb-in).

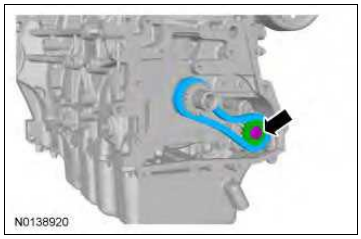


-
  - Tighten to 11 Nm (97 lb-in).

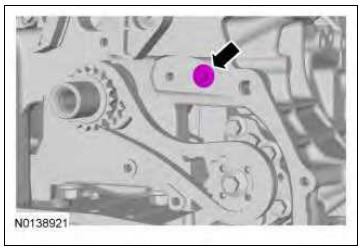
48. **NOTE:** Install a new crankshaft sprocket diamond washer on both sides of the crankshaft sprocket.

NOTE: The crankshaft sprocket flange must be facing away from the engine block.

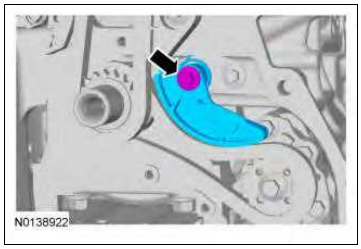
49. • Tighten to 25 Nm (18 lb-ft).



50. • Tighten to 10 Nm (89 lb-in).

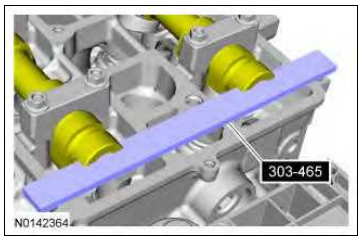


51. • Tighten to 10 Nm (89 lb-in).
• Hook the tensioner spring around the shoulder bolt.

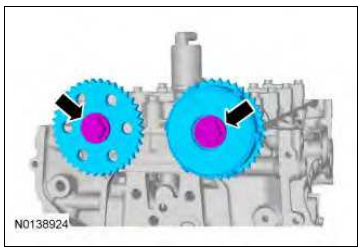


52. *NOTICE:* **The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.**

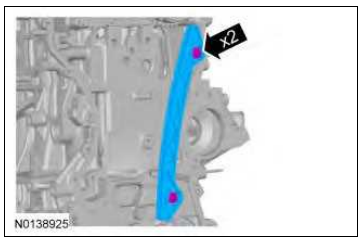
Special Tool(s): Alignment Plate, Camshaft 303-465(T94P-6256-CH) .



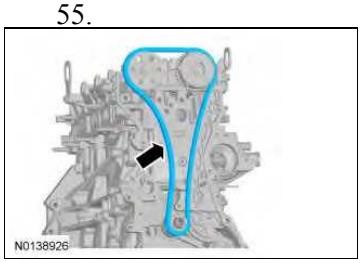
53. **NOTE:** Do not tighten the bolts at this time.



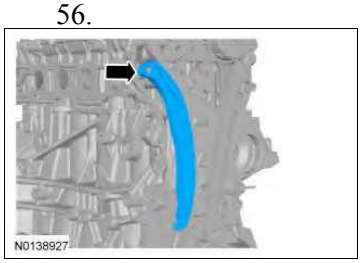
54. • Tighten to 10 Nm (89 lb-in).



55.



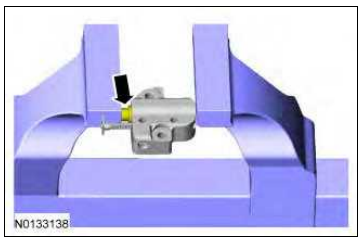
56.



NOTE: If the timing chain tensioner plunger and ratchet assembly are not pinned in the compressed position, follow the next 4 steps.

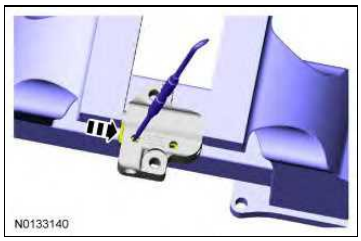
57. ***NOTICE:*** **Do not compress the ratchet assembly. This will damage the ratchet assembly.**

Using the edge of a vise, compress the timing chain tensioner plunger.

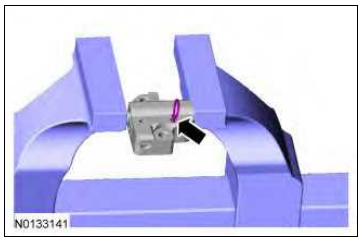


58. General Equipment: Small Pick.
Using a small pick, push back and hold the ratchet mechanism.

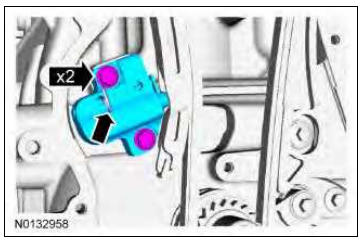
59. General Equipment: Small Pick.
    While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.



60. General Equipment: Holding Pin.
    Install a holding pin into the hole in the tensioner housing to hold the ratchet assembly and the plunger in during installation.



61. General Equipment: Holding Pin.
    - Tighten to 10 Nm (89 lb-in).
    - Remove the holding pin to release the piston.

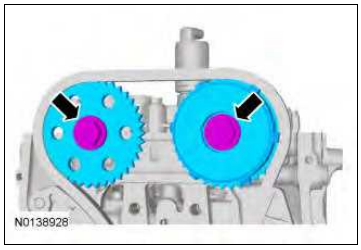


62. ***NOTICE:*** **The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.**

    NOTE: Using the flats on the camshafts to prevent camshaft rotation.

    Tighten to:

    - Stage 1: Tighten to 40 Nm (30 lb-ft).
    - Stage 2: Tighten an additional 60 degrees.

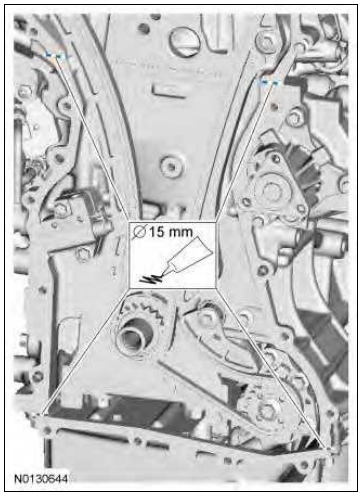


63. *NOTICE:* **Do not use metal scrapers, wire brushes, power abrasive disks or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.**

    Clean and inspect the mounting surfaces of the engine and the front cover.

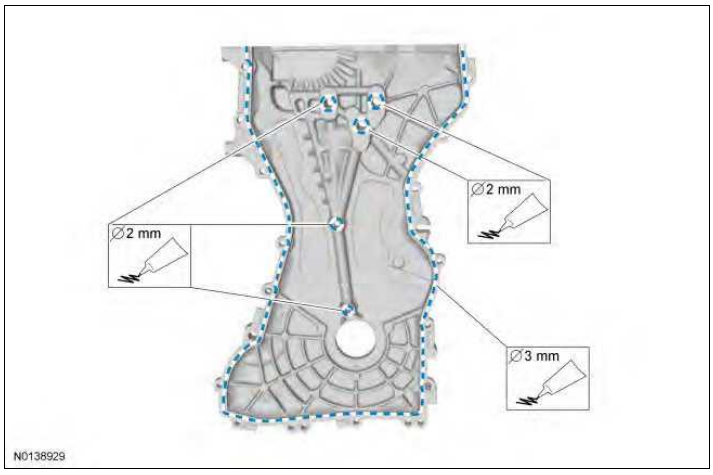
64. **NOTE:** The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motorcraft® Metal Surface Prep.

    Apply a continuous bead of the specified diameter from the specified tube.
    Material: Silicone Gasket and Sealant TA-30.

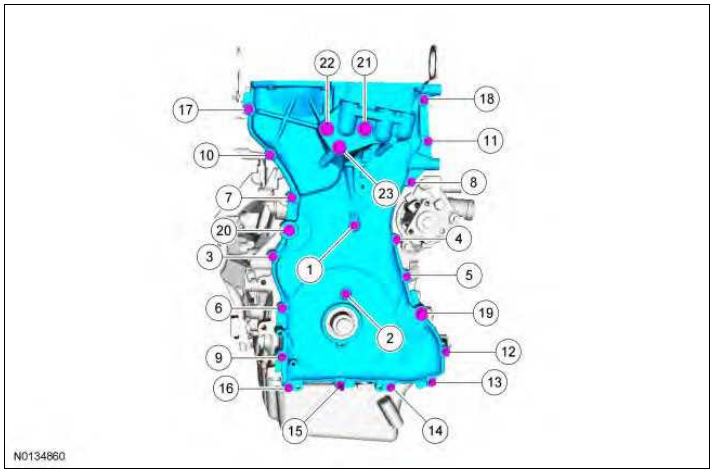


65. **NOTE:** The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the engine front cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motorcraft® Metal Surface Prep.

    Apply a continuous bead of the specified diameter from the specified tube.
    Material: Silicone Gasket and Sealant TA-30.

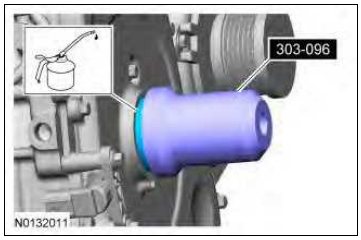


66. Tighten to:
    - Stage 1: Tighten bolts 1 - 18 to 10 Nm (89 lb-in).
    - Stage 2: Tighten bolt 19 to 48 Nm (35 lb-ft).
    - Stage 3: Tighten bolt 20 to 25 Nm (18 lb-ft).
    - Stage 4: Tighten bolts 21- 23 to 48 Nm (35 lb-ft).



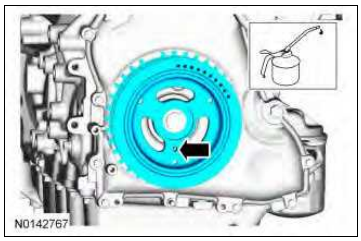
67. **NOTE:** Remove the through-bolt from the Camshaft Front Oil Seal Installer.

    Apply the specified lubricant to the specified component.
    Special Tool(s): Installer, Camshaft Front Oil Seal 303-096.
    Material: Motorcraft® SAE 5W-20 Super Premium Motor Oil.



68. **NOTE:** Do not install the crankshaft pulley bolt at this time.

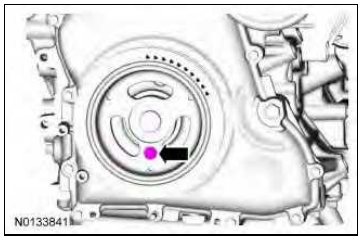
    Apply the specified lubricant to the specified component.
    Material: Motorcraft® SAE 5W-20 Super Premium Motor Oil.
    6 o'clock position.



69. ***NOTICE:*** **Only hand-tighten the 6 mm x 18 mm bolt or damage to the fro cover can occur.**

    NOTE: This step will correctly align the crankshaft pulley to the crankshaft.

    General Equipment: M6 Bolt.

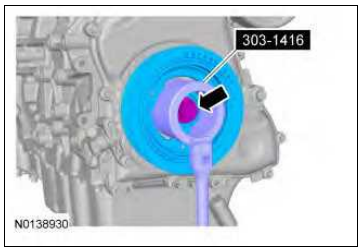


70. ***NOTICE:*** **The crankshaft must remain in the TDC position during installation of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Crankshaft Damper Holding Tool and the bolt should be installed using hand tools only.**

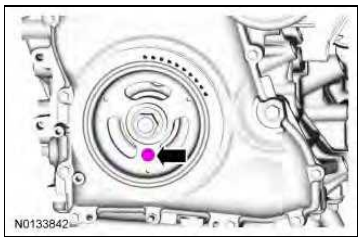
    NOTE: Install a new crankshaft pulley bolt.

    Special Tool(s): Holding Tool, Crankshaft Damper 303-1416.
    Tighten to:

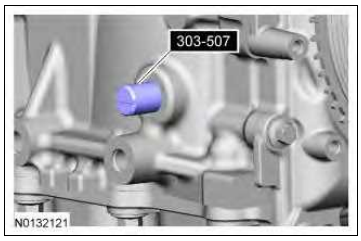
    - Stage 1: Tighten to 100 Nm (74 lb-ft).
    - Stage 2: Tighten an additional 90 degrees (1/4 turn).



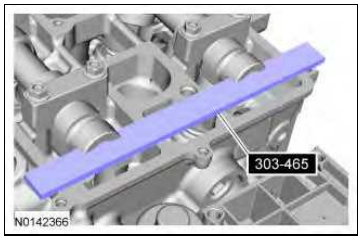
71. Remove the General Equipment: M6 Bolt.



72. Remove the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.

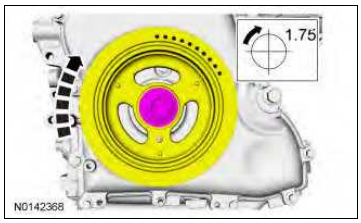


73. Remove the Special Tool(s): Alignment Plate, Camshaft 303-465 (T94P-6256-CH).



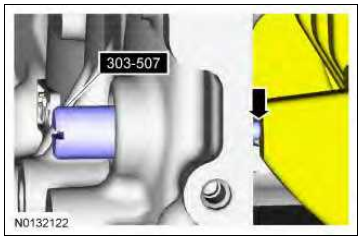
74. **NOTE:** Only turn the engine in the normal direction of rotation.

    Turn one and three-fourths turns.



75. **NOTE:** Only turn the engine in the normal direction of rotation.

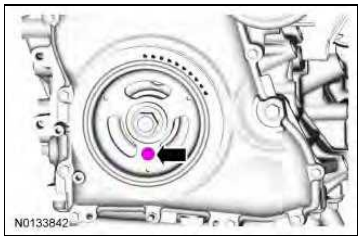
    Install the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.
    Turn the crankshaft clockwise until the crankshaft contacts the Crankshaft TDC Timing Peg.



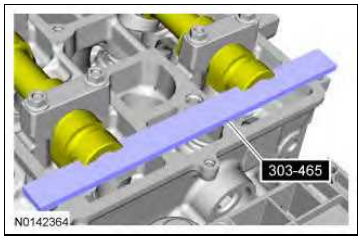
76. ***NOTICE:*** **Only hand-tighten the bolt or damage to the front cover can occur.**

    Install the General Equipment: M6 Bolt.

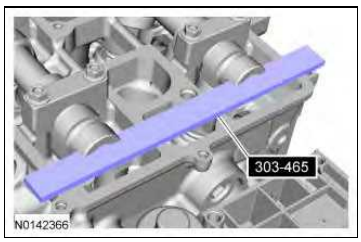
    - Check the position of the crankshaft pulley.
    - If it is not possible to install the bolt, the engine valve timing must be corrected.



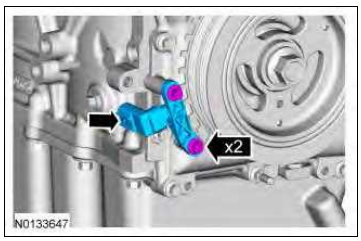
77. Install the Special Tool(s): Alignment Plate, Camshaft 303-465 (T94P-6256-CH).
    - If it is not possible to install the Camshaft Alignment Plate, the engine valve timing must be corrected.



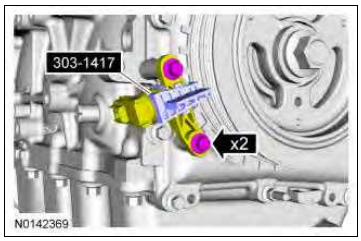
78. Remove the Special Tool(s): Alignment Plate, Camshaft 303-465 (T94P-6256-CH).



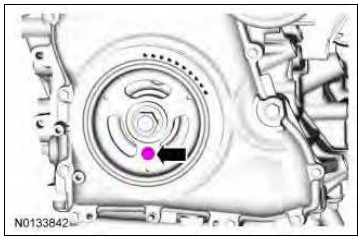
79. Do not tighten the bolts at this time.



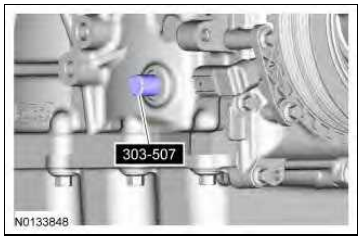
80. Special Tool(s): Crank Sensor Alignment Tool 303-1417.
    Align the CKP sensor.
    - Tighten to 7 Nm (62 lb-in).



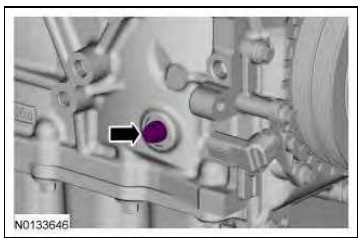
81. Remove the General Equipment: M6 Bolt.



82. Remove the Special Tool(s): Timing Peg, Crankshaft TDC 303-507.



83. • Tighten to 20 Nm (177 lb-in).

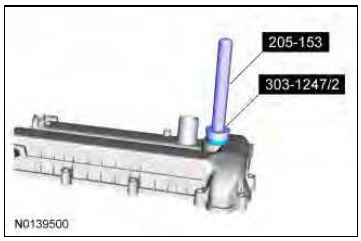


84. *NOTICE:* **Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.**

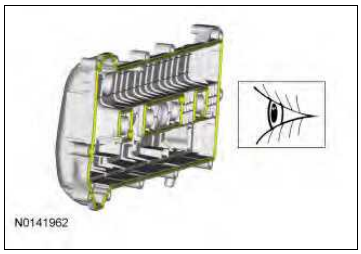
    Clean the valve cover gasket surface with Motorcraft® Metal Surface Prep.

85. **NOTE:** Installation of a new VCT solenoid seal is required if a damaged seal was removed during disassembly of the engine.

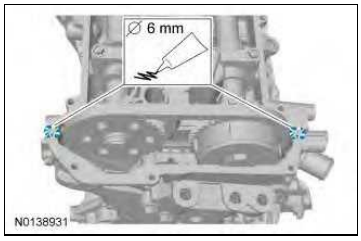
    Special Tool(s): Handle 205-153 and Installer, VCT Spark Plug Tube Seal 303-1247/2.



86. Visual check.

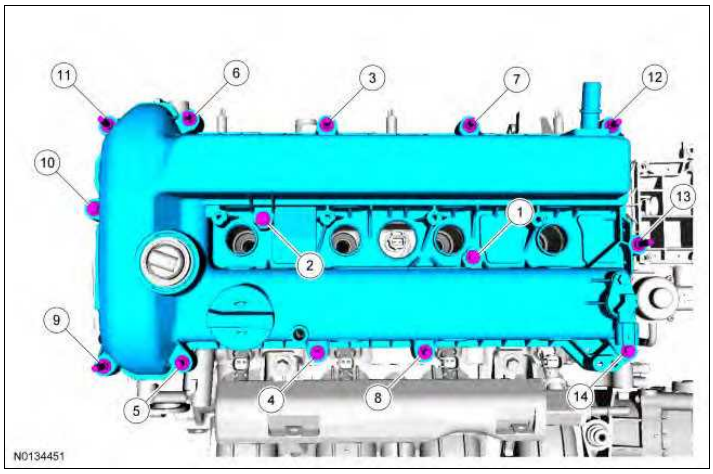


87. Apply a continuous bead of the specified diameter from the specified tube.
    Material: Silicone Gasket and Sealant TA-30.



88. **NOTE:** The valve cover must be secured within 10 minutes of silicone gasket application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with metal surface cleaner.

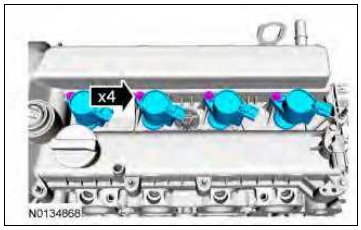
    - Tighten to 10 Nm (89 lb-in).



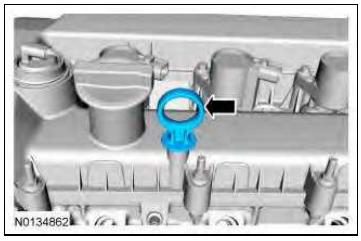
89. Visual check.

90. **NOTE:** Apply dielectric compound to the inside of the coil-on-plug boots.

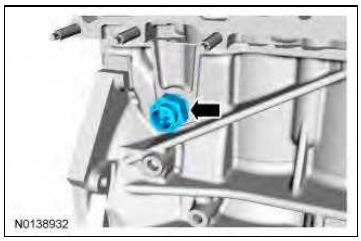
    - Tighten to 8 Nm (71 lb-in).



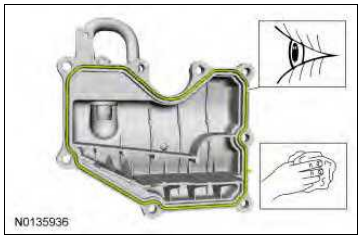
91.



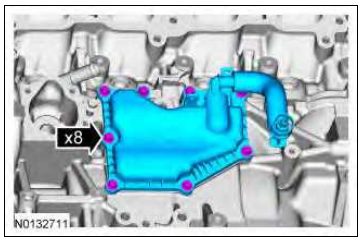
92. If equipped.
    - Tighten to 40 Nm (30 lb-ft).



93. Visual check.
    Clean the specified component.

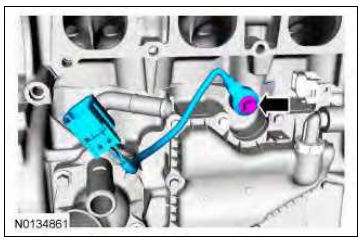


94. - Tighten to 10 Nm (89 lb-in).

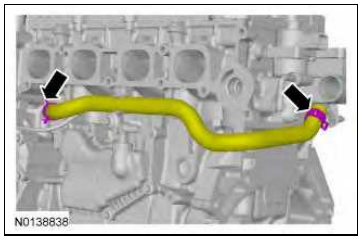


95. **NOTE:** The KS must not touch the crankcase vent oil separator.

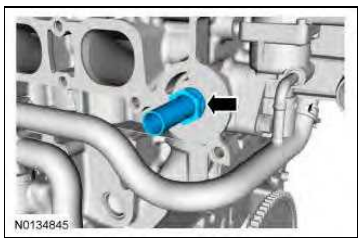
    - Tighten to 20 Nm (177 lb-in).



96.



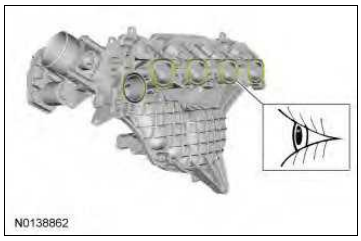
97. • Tighten to 55 Nm (41 lb-ft).



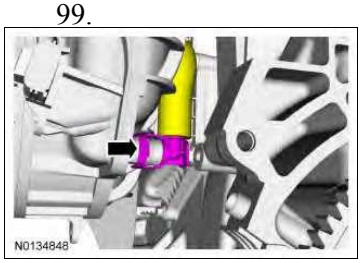
98. ***NOTICE:*** **If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.**

Visual check.

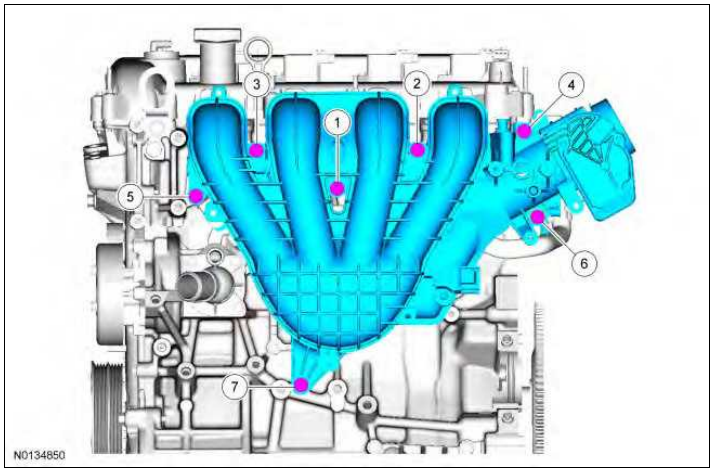
• If necessary, install new intake manifold gaskets.



99.



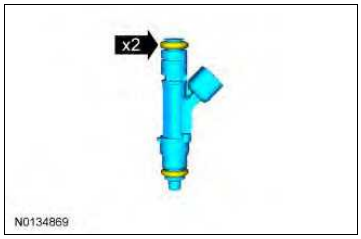
100. • Tighten to 18 Nm (159 lb-in).



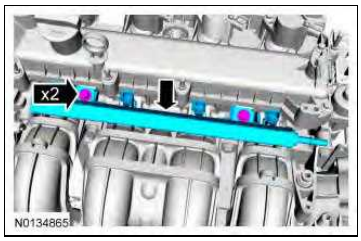
101. ***NOTICE:*** **Use O-ring seals that are made of special fuel-resistant material. Use of ordinary O-rings can cause the fuel system to leak. Do not reuse the O-ring seals.**

Install new fuel injector O-rings.

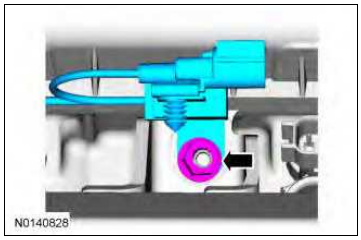
- Separate the fuel injectors from the fuel rail.
- Remove and discard the fuel injector O-rings.
- Install new O-rings and lubricate with clean engine oil.
- Install the fuel injectors onto the fuel rail.



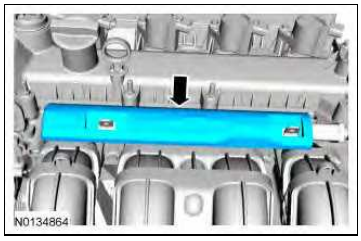
102. • Tighten to 23 Nm (17 lb-ft).



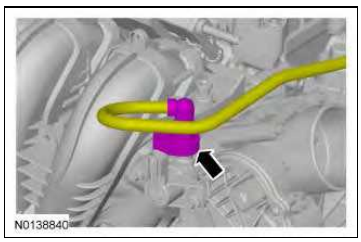
103. • Tighten to 10 Nm (89 lb-in).



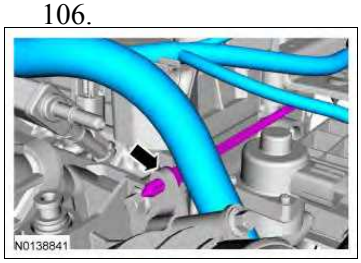
104.



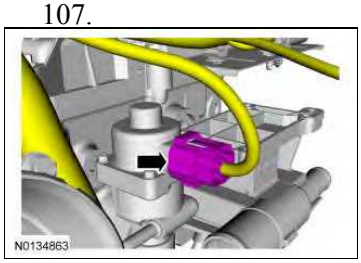
105. Refer to Section 310-00 .



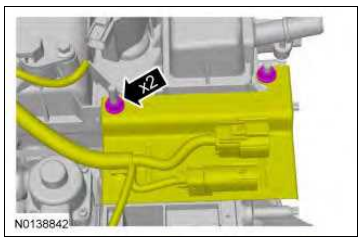
106.



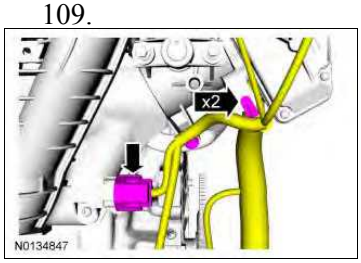
107.



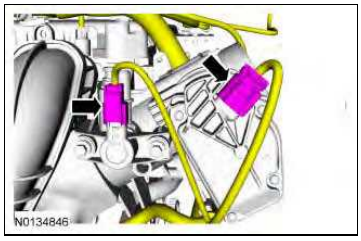
108. • Tighten to 9 Nm (80 lb-in).



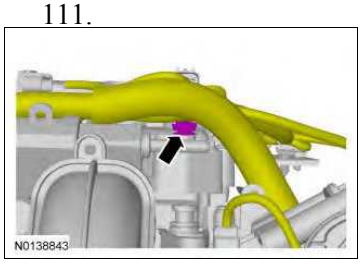
109.



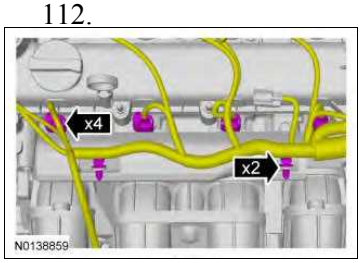
110.



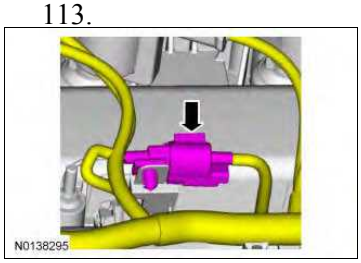
111.



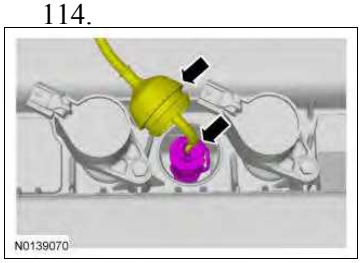
112.



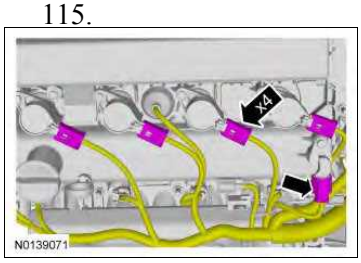
113.



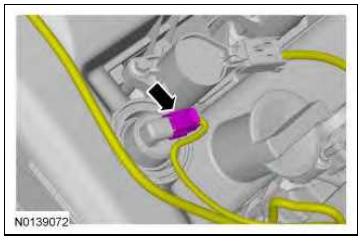
114.



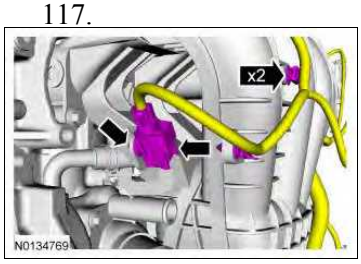
115.



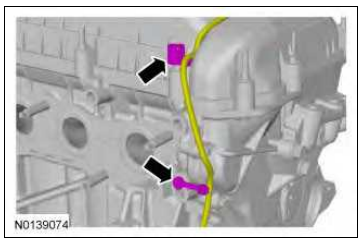
116.



117.



118. .



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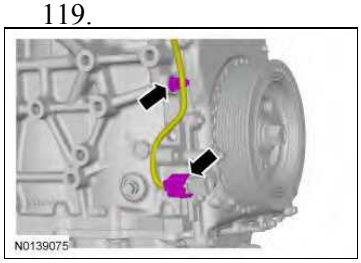
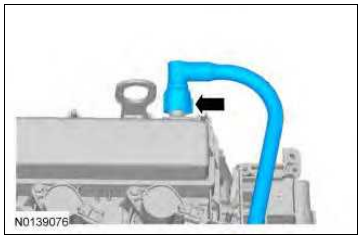


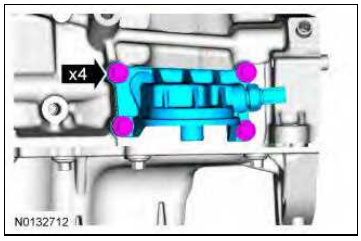
120. Refer to Section 310-00 .



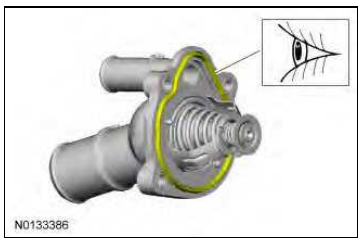
121. **NOTE:** Clean the gasket mating surfaces with Motorcraft® Metal Surface Prep.

NOTE: Install a new gasket.

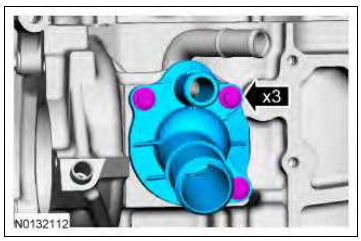
- Tighten to 25 Nm (18 lb-ft).



122. Visual check.



123. • Tighten to 10 Nm (89 lb-in).

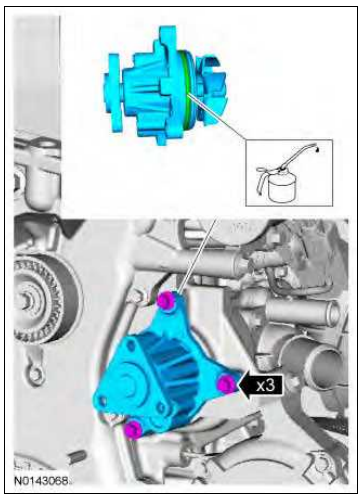


124. **NOTE:** Clean the coolant pump mating surface with Motorcraft® Metal Surface Prep.

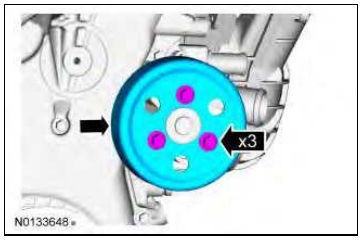
NOTE: Install a new O-ring seal.

Apply the specified lubricant to the specified component.
Material: Motorcraft® Orange Antifreeze/Coolant Prediluted

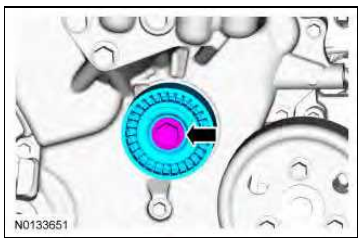
• Tighten to 10 Nm (89 lb-in).



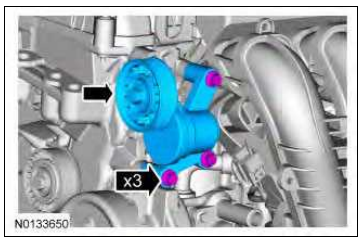
125. • Tighten to 20 Nm (177 lb-in).



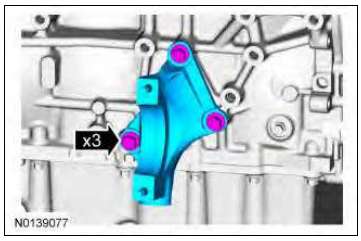
126. • Tighten to 11 Nm (97 lb-ft).



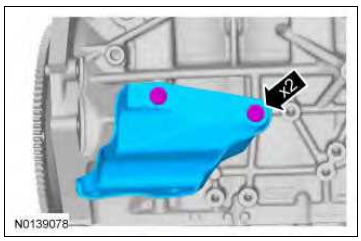
127. • Tighten to 25 Nm (18 lb-ft).



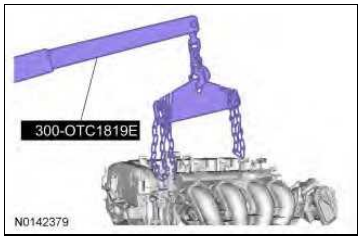
128. • Tighten to 48 Nm (35 lb-ft).



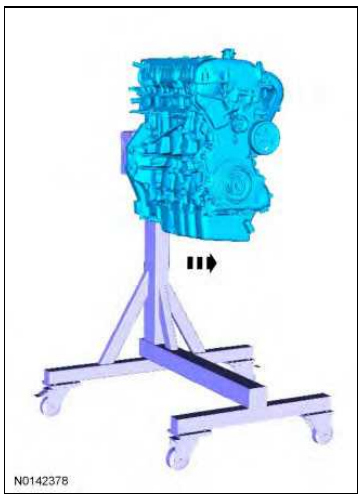
129. • Tighten to 25 Nm (18 lb-ft).



130. Install the Special Tool(s): 2,200# Floor Crane, Fold Away 300-OTC1819E or equivalent. General Equipment: Spreader Bar.



131. General Equipment: Engine Stand.



132. **NOTE:** Special bolts are used for installation. Do not use standard bolts.

Special Tool(s): Holding Tool, Flywheel 303-103
Tighten to:

- Stage 1: Tighten to 50 Nm (37 lb-ft).
- Stage 2: Tighten to 80 Nm (59 lb-ft).
- Stage 3: Tighten to 112 Nm (83 lb-ft).

Engine

Special Tool(s)

	2,200# Floor Crane, Fold Away 300-OTC1819E or equivalent
	Powertrain Lift 300-OTC1585AE or equivalent
	Adjustable Grip Arm, 1735A 014-00001 or equint

General Equipment

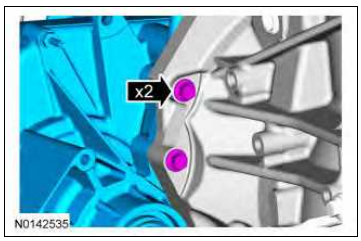
Cable Tie
Spreader Bar

Material

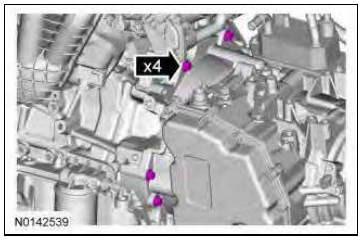
Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Motorcraft® MERCON® LV Automatic Transmission Fluid XT-10-QLVC	MERCON® LV

⚠ **WARNING: Do not smoke, carry lighted tobacco or have an open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.**

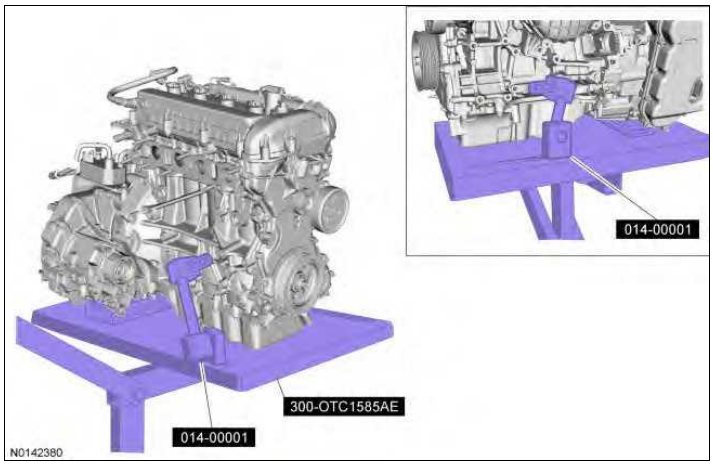
1. • Tighten to 48 Nm (35 lb-ft).



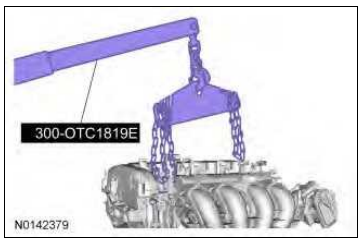
2. • Tighten to 48 Nm (35 lb-ft).



3. Special Tool(s): Powertrain Lift 300-OTC1585AE or equivalent and Adjustable Grip Arm, 1735A 014-00001 or equivalent.
   Secure the engine to the lift table.



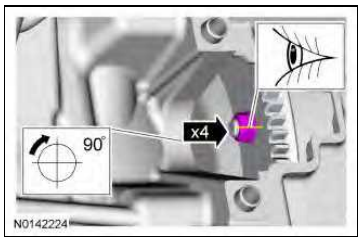
4. Remove the Special Tool(s): 2,200# Floor Crane, Fold Away 300-OTC1819E or equivalent.
   General Equipment: Spreader Bar.



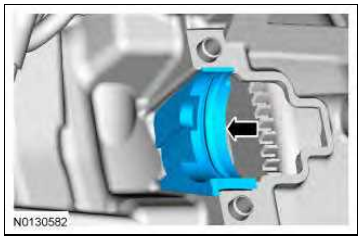
5. ***NOTICE:*** **Only rotate the engine in a clockwise direction only or engine damage will occur.**

   Visual check.
   Turn the component CW 90 degrees.

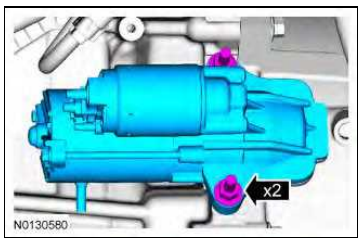
   - Tighten to 40 Nm (30 lb-ft).



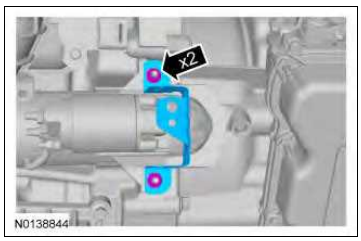
6.



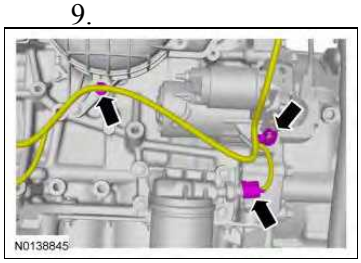
7. • Tighten to 35 Nm (26 lb-ft).



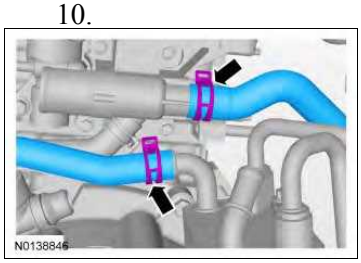
8. • Tighten to 18 Nm (159 lb-in).



9.



10.



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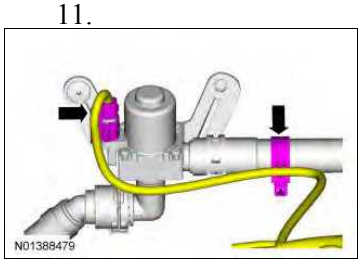
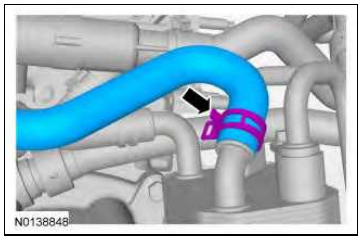
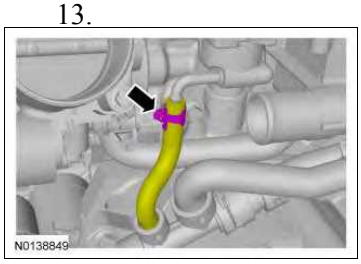


12.



13.



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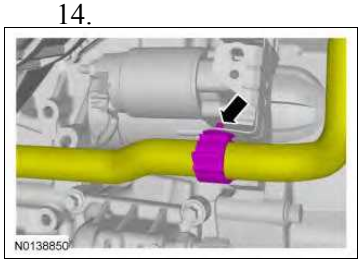
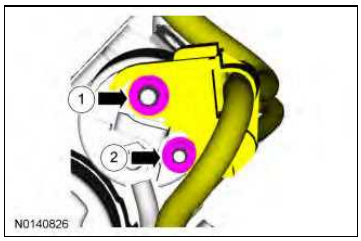
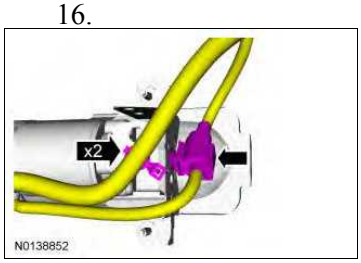


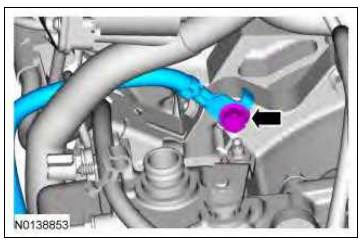
15. 1. Tighten to 12 Nm (106 lb-in).
    2. Tighten to 5 Nm (44 lb-in).



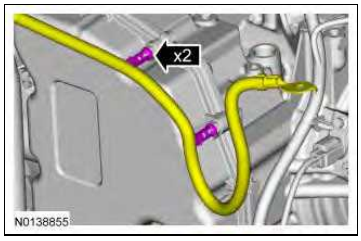
16.



17. • Tighten to 48 Nm (35 lb-ft).



18.



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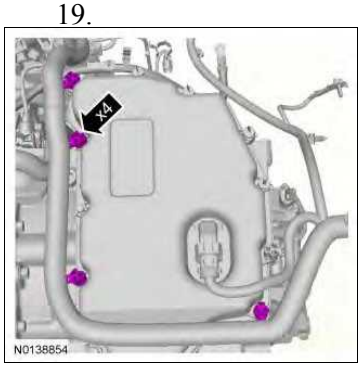

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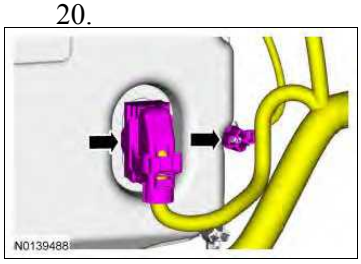

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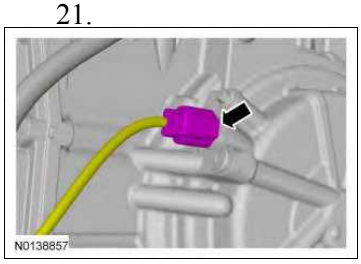
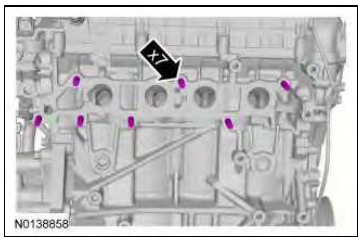
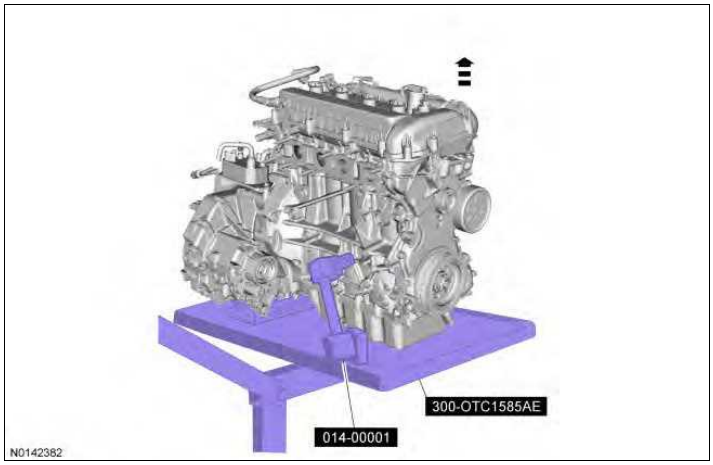


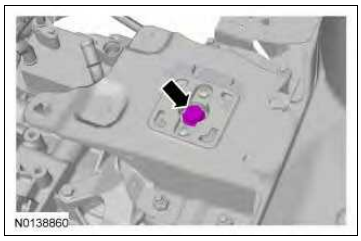
22. • Tighten to 17 Nm (150 lb-in).



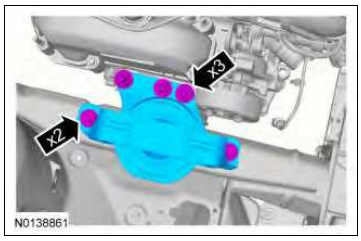
23. Special Tool(s): Powertrain Lift 300-OTC1585AE or equivalent and Adjustable Grip Arm, 1735A 014-00001 or equivalent.



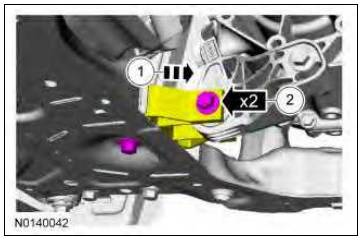
24. • Tighten to 148 Nm (109 lb-ft).



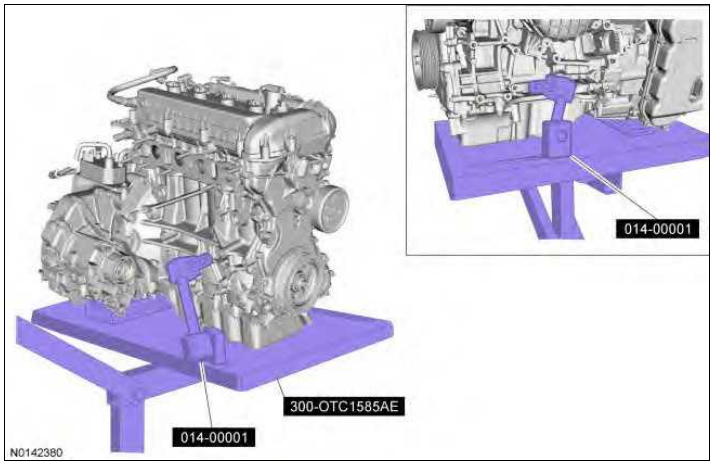
25. • Tighten the nuts to 80 Nm (59 lb-ft).
• Tighten the bolts to 90 Nm (66 lb-ft).



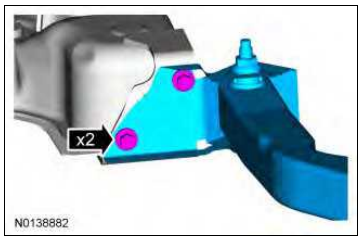
26. • Tighten to 125 Nm (92 lb-ft).



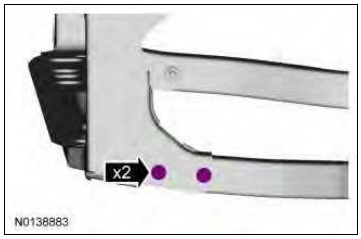
27. Remove the Special Tool(s): Powertrain Lift 300-OTC1585AE or equivalent and Adjustable Grip Arm, 1735A 014-00001 or equivalent.



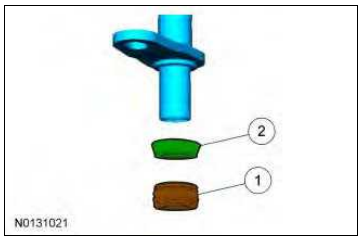
28. • Tighten to 20 Nm (177 lb-in).



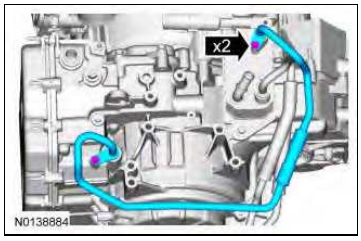
29. • Tighten to 20 Nm (177 lb-in).



30. If removed, inspect the transmission mounted cooler tube backing rings and seals for damage and install new backing rings or seals as necessary. Lubricate the transmission mounted cooler tube backing rings and seals with clean tranmission fluid and install on the tranmission cooler tube.
    1. Seals (7D258).
    2. Backing rings (7J324).

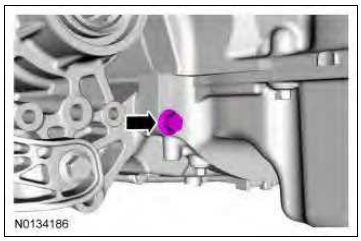


31. • Tighten to 9 Nm (80 lb-in).

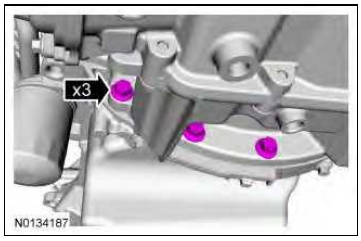


32. Apply the specified lubricant to the specified component.
    Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.
    - Tighten the oil filter three-fourths turn after the oil filter gasket makes contact with the oil filter adapter.

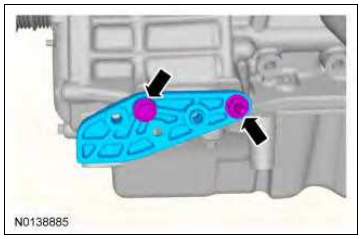
33. • Tighten to 48 Nm (35 lb-ft).



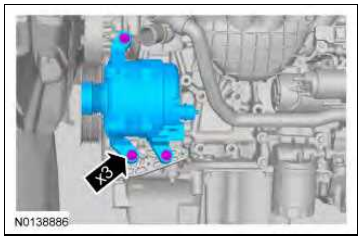
34. • Tighten to 48 Nm (35 lb-ft).



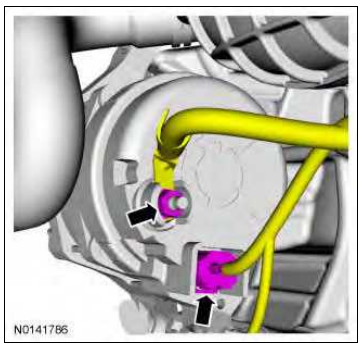
35. • Tighten to 25 Nm (18 lb-ft).



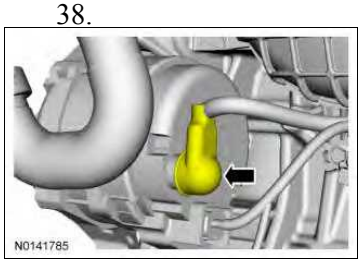
36. • Tighten to 25 Nm (18 lb-ft).



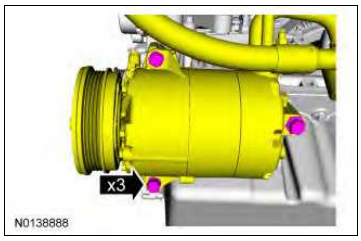
37. • Tighten to 15 Nm (133 lb-in).



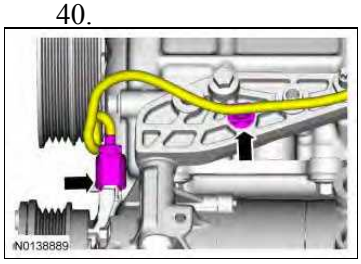
38.



39. • Tighten to 25 Nm (18 lb-ft).



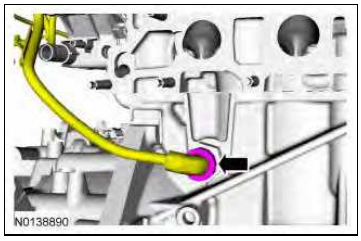
40.



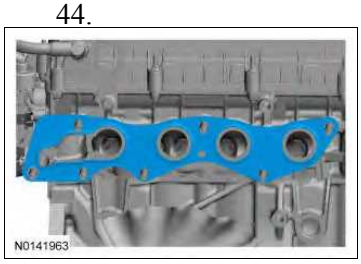
41. Install the accessory drive belt and the A/C belt. Refer to Section 303-05 .

42. Install the windshield washer bottle. Refer to Section 501-16 .

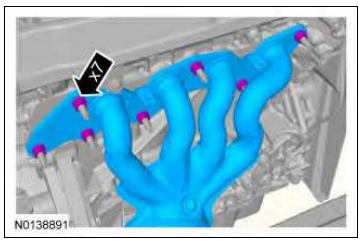
43.



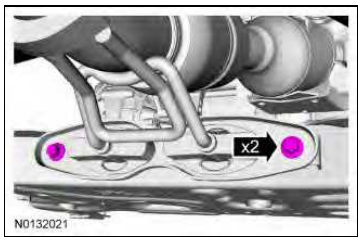
44.



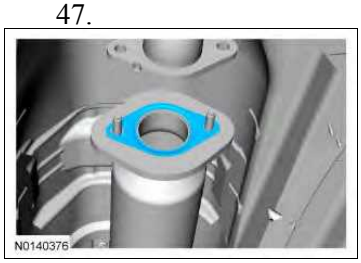
45. • Tighten to 55 Nm (41 lb-ft).



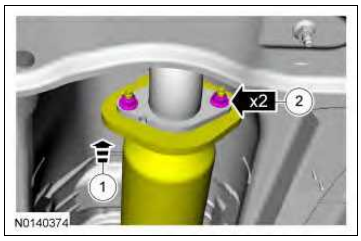
46. • Tighten to 25 Nm (18 lb-ft).



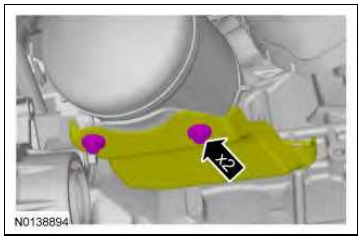
47.



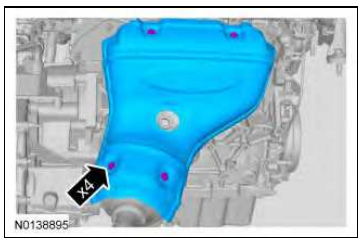
48. • Tighten to 48 Nm (35 lb-ft).



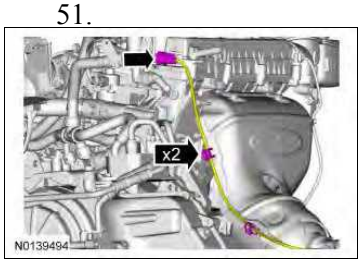
49. • Tighten to 25 Nm (18 lb-ft).



50. • Tighten to 11 Nm (97 lb-in).

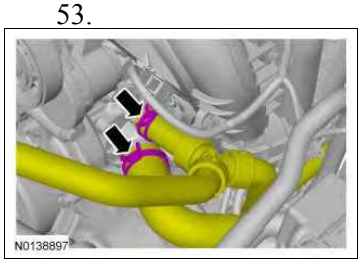


51.

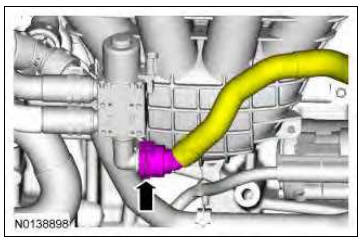


52. Install the HO2S . Refer to Section 303-14 .

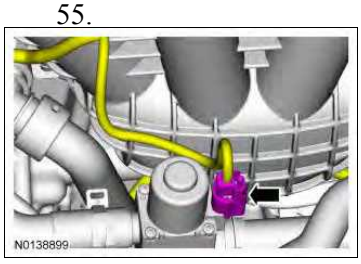
53.



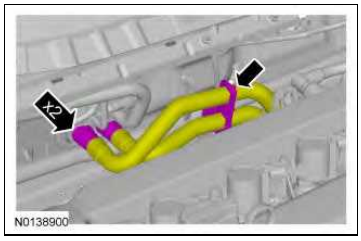
54. **NOTE:** Radiator and shroud removed for clairty.



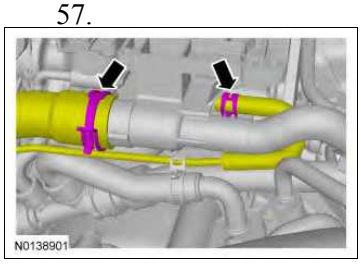
55.



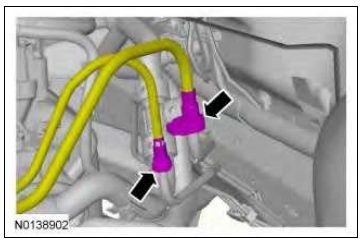
56.



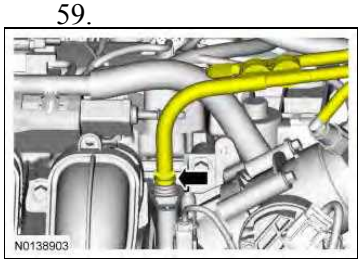
57.



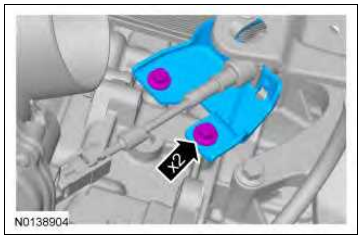
58. Refer to Section 310-00 .



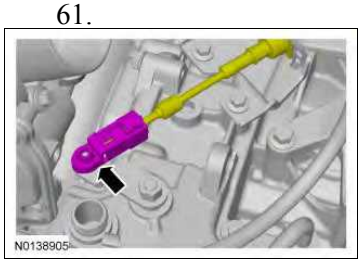
59.



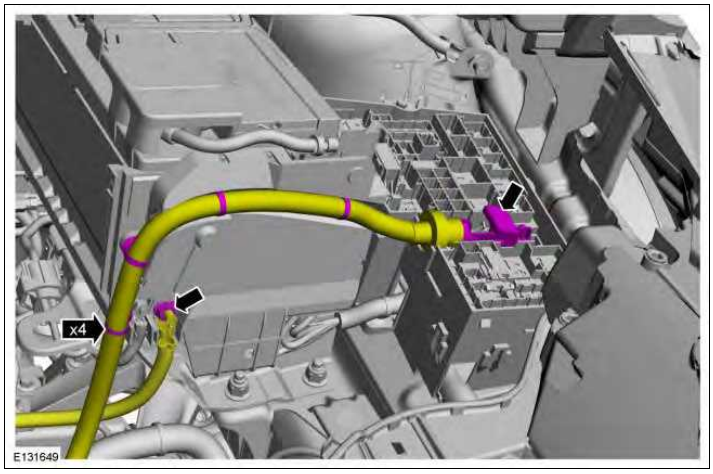
60. • Tighten to 25 Nm (18 lb-ft).



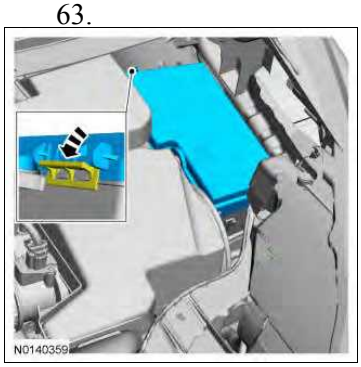
61.



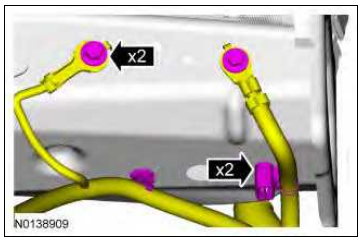
62. • Tighten to 12 Nm (106 lb-in).



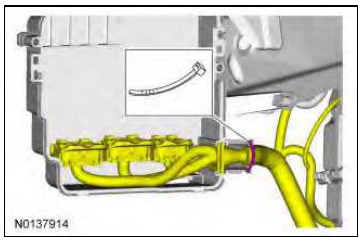
63.



64. • Tighten to 23 Nm (17 lb-ft).



65. Install a new cable tie.



66. Install the PCM. Refer to Section 303-14 .

67. Install the RH and LH halfshafts. Refer to Section 205-04 .

68. Install the degas bottle. Refer to Section 303-03 .

69. Install the battery tray. Refer to Section 414-01 .

70. Install the engine ACL and ACL outlet pipe. Refer to Section 303-12 .

71. Install the cowl panel. Refer to Section 501-02 .

72. Fill the engine with clean engine oil.
    Material: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil.

73. Fill and bleed the cooling system. Refer to Section 303-03 .

74. Fill the transmission fluid. Refer to Section 307-01 .

75. If the engine was disassembled, use the scan tool to perform the Misfire Monitor Neutral Profile Correction procedure following the on-screen instructions.
