2012 Transit Connect
Workshop Manual

Quick Links

Table of Contents

welds cannot be duplicated with conventional welding equipment and structural integrity may be compromised. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

⚠ WARNING: Do not carry out body side sectioning repairs in areas of door hinge or striker anchoring points. Welding within 50 mm (1.96 in) of door hinge or striker locations may compromise structural integrity during a collision. Failure to follow these instructions may result in serious injury to vehicle occupant(s).

⚠ WARNING: Invisible ultraviolet and infrared rays emitted in welding can injure unprotected eyes and skin. Always use protection such as a welder's helmet with dark-colored filter lenses of the correct density. Electric welding will produce intense radiation, therefore, filter plate lenses of the deepest shade providing adequate visibility are recommended. It is strongly recommended that persons working in the weld area wear flash safety goggles. Also wear protective clothing. Failure to follow these instructions may result in serious personal injury.

⚠ WARNING: If a vehicle has been in a crash, inspect the restraints control module (RCM) and the impact sensor (if equipped) mounting areas for deformation. If damaged, restore the mounting areas to the original production configuration. A new RCM and sensors must be installed whether or not the air bags have deployed. Failure to follow these instructions may result in serious personal injury or death in a crash.

⚠ WARNING: Do not permanently remove the trailer hitch. The trailer hitch is an integral part of the vehicle frame. Always reinstall the hitch before delivery of the vehicle to the customer. Failure to follow this instruction may compromise vehicle crash integrity and increase the risk of personal injury in a rear end collision.

⚠ WARNING: Never install used or reconditioned parts (as specified below) from pre-owned, salvaged or damaged vehicles. The use of such parts could lead to serious injury.

Never use non-Ford parts or accessories for completing repairs.

Ford Motor Company does not approve or recognize body and structural repair procedures, tools, parts or anything but new genuine Ford equipment. Ford cannot attest to the safety, quality, durability or legality of non-Ford parts or accessories. Use of such parts could lead to serious personal injury as they may contain damage which is not visible.

Ford does not approve use of the following:

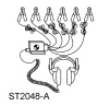
- Salvaged or used parts
- Major body clips or assemblies from salvage vehicles
- Aftermarket structural or body components
- Salvaged or reconditioned wheels
- Used supplemental restraint system (SRS) components
    - ♦ air bags
    - ♦ restraint system modules
    - ♦ safety belts, buckles or retractors
    - ♦ crash sensors

Returning a vehicle to pre-accident condition can only be assured if repair procedures are carried out by skilled technicians using new genuine Ford parts and Ford-approved methods. Structural component repair procedures approved by Ford, using genuine Ford parts, have been validated by Ford Motor Company engineers.

Ford Motor Company does not endorse, cannot attest to, and makes no representations regarding structural

Noise, Vibration and Harshness (NVH)

Special Tool(s)

 ST2311-A	Electronic Vibration Analyzer (EVA) 100-F027 (014-00344) or equivalent
 ST2312-A	EngineEAR 107-R2100 or equivalent
 ST2048-A	EngineEAR/ChassisEAR 107-R2102 or equivalent
 ST3025-A	Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix) 257-00018 or equivalent
 ST2314-A	Ultasonic Leak Detector 134-R0135 or equivalent

Diagnostic Theory

The shortest route to an accurate diagnosis results from:

- system knowledge, including comparison with a known good system.
- system history, including repair history and usage patterns.
- condition history, especially any relationship to repairs or sudden change.
- knowledge of possible sources.
- using a systematic diagnostic method that divides the system into related areas.

The diagnosis and correction of NVH symptoms requires:

- a road or system test to determine the exact nature of the symptom.
- an analysis of the possible causes.
- testing to verify the cause.
- repairing any symptoms found.
- a road test or system test to make sure the cause has been corrected or brought back to within an acceptable range.

Diagnostic Procedure Overview

Qualifying the symptom by the particular sensation present can help narrow down the cause. Always use the "symptom" to "system" to "component" to "cause" diagnosis technique. This diagnostic method divides the problem into related areas to correct the customer concern.

- Verify the "symptom".

- REINSTALL windshield/rear glass. REFER to Section 501-11 .
- Rear hood seal at base of windshield misaligned/damaged
- REALIGN or INSTALL a new seal as necessary.
- Draft noise at cowl
- Cowl seal misaligned/damaged
- REALIGN or INSTALL a new seal as necessary.
- Wind noise created by airflow over or behind body panels
- Fender splash shield misaligned
- REALIGN fender splash shield.
- Body panel misaligned (exposed edge)
- REALIGN appropriate body panel.
- Hood misaligned (front margin)
- CHECK hood gaps and fit. ADJUST hood as necessary.
- Front grille edge noise
- APPLY foam in hollow areas behind louvers.
- Wind noise created by grille opening panel
- Grille relationship to leading edge on hood
- If possible, ADJUST grille opening panel forward to eliminate wind noise.
- Sharp edges due to material imperfections
- REMOVE sharp edges (no damage to visible surface).
- Wind noise from air extractor (body vent)
- Air extractor housing seated incorrectly
- REINSTALL air extractor housing.
- Air extractor housing or flaps damaged
- INSTALL a new air extractor.
- Wind noise from bug shield/exterior windshield sun visor
- Turbulence created by location and shape

Torque Specifications

Description	Nm	lb-ft	lb-in
A-pillar trim panel assist handle screw	6	-	53
Front door trim panel pull handle screw	2	-	18
Safety belt anchor bolt	40	30	-
Safety belt D-ring bolt	40	30	-

Normal Operation

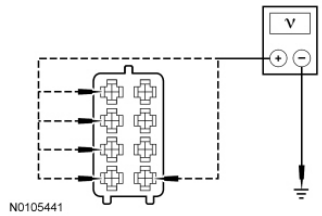
The exterior mirror control switch supplies voltage and ground to control LH and RH exterior mirror motor movement. Each mirror contains a horizontal and vertical motor. The exterior mirror control switch controls movement by reversing polarity of the voltage and ground circuits being supplied to each motor.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Exterior mirror control switch
- Exterior mirror motor
- Exterior mirror

PINPOINT TEST C: A SINGLE MIRROR DOES NOT OPERATE CORRECTLY

NOTICE: **Use the correct probe adapter(s) from the Flex Probe Kit when making measurements. Failure to use the correct probe adapter(s) can damage the connector.**

Test Step	Result / Action to Take
C1 CHECK THE EXTERIOR MIRROR CONTROL CIRCUITS FOR A SHORT TO VOLTAGE	
• Ignition OFF. • Disconnect: Exterior Mirror Control Switch C527. • Ignition ON. • Measure the voltage between ground and exterior mirror control switch: ♦ C527-2, circuit 34-AD10 (BU/YE), harness side. ♦ C527-5, circuit 33-AD11 (YE/VT), harness side. ♦ C527-3, circuit 32-AD1 (WH/RD), harness side. ♦ C527-7, circuit 33-AD8 (YE/BU), harness side. ♦ C527-1, circuit 34-AD7 (BU/RD), harness side.  • **Is any voltage present?**	**Yes** REPAIR the circuit(s). TEST the system for normal operation. **No** GO to C2 .
C2 CHECK THE EXTERIOR MIRROR CONTROL CIRCUITS FOR A SHORT TO GROUND	

Seats

Front Seats

The front seats are equipped with the following serviceable components:

- Adjustable armrest (driver seat)
- Adjustable head restraints
- Head restraint guide sleeves
- Adjustable and static lumbar assemblies
- Adjustable lumbar knob (driver seat)
- Side air bags
- Backrest frame
- Backrest/cushion foam pads and covers
- Recliner handles
- Seat height adjust handle (driver seat track)
- Inboard and outboard cushion side shields
- Occupant Classification Sensor (OCS) system (passenger seat cushion)
- Safety belt buckles
- Seat position sensor (driver seat track)
- Cushion half pan and suspension spring
- Seat tracks
- Seat wiring harnesses

Occupant Classification Sensor (OCS)

NOTE: OCS system components [seat wiring harness, seat cushion foam pad, bladder with pressure sensor and Occupant Classification System Module (OCSM)] are calibrated to each other and are serviced as an assembly. If new OCS system components are needed, an OCS system service kit must be installed as an assembly.

The OCS system is standard equipment on all front passenger seats. For information on diagnosing or servicing the OCS system, refer to the appropriate procedure in Section 501-20B .

Seat Side Air Bags

Driver and passenger seat side air bags are attached to the seat backrest frame. For diagnostic information, or if the seat side air bag has deployed, refer to the appropriate procedure in Section 501-20B .

Seat Track

The driver and front passenger seats are equipped with manually adjustable tracks. The driver seat track includes a manual height adjustment that ratchets up or down to raise and lower the seat track. The seat tracks are serviced as assemblies.

Rear Seats

Cushion Foam Pad, Driver Seat	5, 11-12 and 16-26
Cushion Half Pan, Driver Seat	2-3, 5, 12, 16-21
Cushion Half Pan, Passenger Seat	2-3, 6-10, 12, 16-26
Inboard Side Shield	17
Occupant Classification Sensor (OCS) System	6-12, 16-18 and 20-26
Outboard Side Shield	18-20
Safety Belt Buckle	13, 17 and 21
Seat Position Sensor	4 and 21
Seat Track	2-10 and 12-26
Cushion Spring Assembly, Driver Seat	3, 5, 12, 16-21
Cushion Spring Assembly, Passenger Seat	3, 6-8, 10, 12, 16-26

2. Install the cushion half pan and 4 screws to the seat track.
    - Tighten to 6 Nm (53 lb-in).

3. Install the cushion spring assembly to the cushion half pan and seat track.

Driver seat

4. Install the seat position sensor and connect the electrical connector.
    - Make sure the clip is locked for correct installation.
    - Correctly install the wire harness as noted in removal and install the red electrical connector to the seat electrical bulkhead connector.

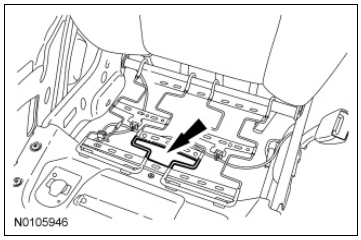
5. Install the foam pad.

Passenger seat

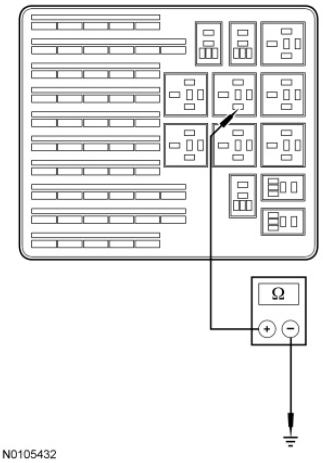
6. ***NOTICE:*** **While positioning the seat cushion frame and Occupant Classification Sensor (OCS) system assembly, be careful not to damage any of the components. Failure to do so may result in component failure.**

   Install the OCS bladder.

    - Route the pressure sensor and hose through the correct opening in the suspension spring.
    - Position the OCS bladder to the cushion half pan and install the 2 pin-type retainers.



7. Bend the locking tab back on the pressure sensor bracket and install the pressure sensor onto the bracket making sure the locking tab is completely engaged.
    - Check the pressure sensor bracket for secure mounting. If the bracket is loose, install a new rivet to tighten the bracket.

 • **Is the resistance greater than 10,000 ohms?**	
F4 CHECK FOR CORRECT GEM MODULE OPERATION	
• Disconnect the GEM electrical connectors. • Check for: ♦ corrosion. ♦ pushed-out pins. • Connect the GEM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new GEM . REFER to Section 419-10 . TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test G: The Heated Windshield is Inoperative or Does Not Operate Correctly

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

Normal Operation

When the engine is running and the heated windshield defrost switch is pressed, the defrost switch supplies a ground input to the Generic Electronic Module (GEM). The GEM then activates the left and right heated windshield relays which supply voltage to the heated windshield defrost grids. The left and right heated windshield defrost grids do not share any common power or ground circuits. The heated windshield defrost switch Light Emitting Diode (LED) is illuminated whenever the right heated windshield relay is active.

- DTC B2113 (Heated Windshield Input Short to Ground) - Sets when the heated windshield defrost switch is active during an on-demand self-test or when a short to ground is detected in the heated windshield defrost switch input circuit.
- DTC B2248 (Heated Windshield Relay Coil Circuit Failure) - Sets when a short to voltage is detected in the lefd right heated windshield relay coil control circuit.
- DTC B2256 (Front Window Heater Relay Short to Ground) - Sets when an open or short to ground is detected in the left and right heated windshield relay coil control circuit.

This pinpoint test is intended to diagnose the following:

- Fuse(s)
- Wiring, terminals or connectors
- Left heated windshield relay

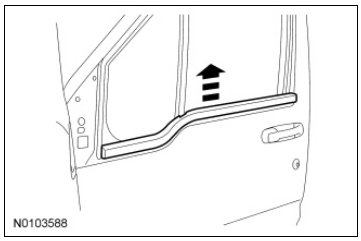
Door Glass Top Run - Front

Removal and Installation

1. Lower the front door glass to the fully DOWN position.

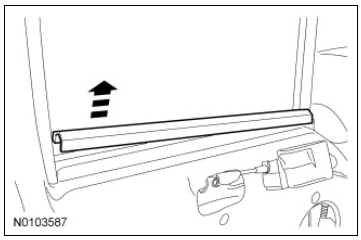
2. Remove the exterior mirror assembly. For additional information, refer to Section 501-09 .

3. Remove the exterior door window weatherstrip.
   - Begin pulling up at rear edge of weatherstrip, and work along the remaining weatherstrip pulling straight up.



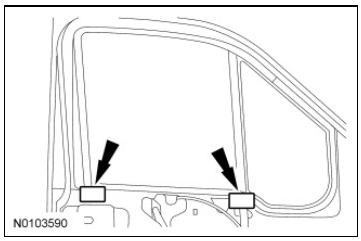
4. Remove the interior door trim panel. For additional information, refer to Section 501-05 .

5. Remove the interior door window weatherstrip.



6. Remove the watershield.

7. Remove the insulation pads.

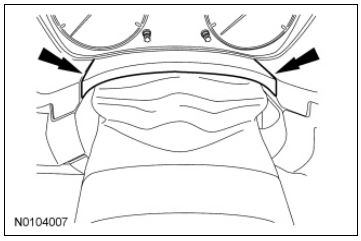


8. Remove the quarter window glass division bar lower retaining screw.
   - To install, tighten to 10 Nm (89 lb-in).

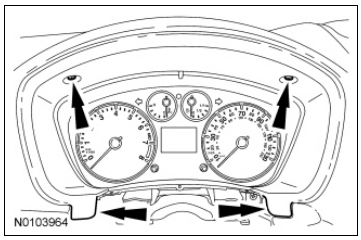
Instrument Cluster Finish Panel

Removal and Installation

1. Lift the sides of the front upper steering column extension cover upward to release the retaining clips from the instrument cluster finish panel.



2. Remove the instrument cluster finish panel in the following sequence.
    1. Remove the 2 upper and 2 side instrument cluster finish panel screws.
    2. Pull the instrument cluster finish panel toward the rear of the vehicle.



3. To install, reverse the removal procedure.
    - To install, make sure to align the trim panel alignment tabs to the alignment holes in the instrument panel.

grounded by the all lock circuit through the GEM . On a lock request, the GEM supplies voltage to all the door lock actuators on the all lock circuit. The cargo door lock actuator is grounded through the cargo door relay.

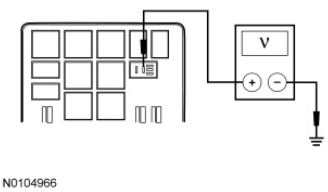
This pinpoint test is intended to diagnose the following:

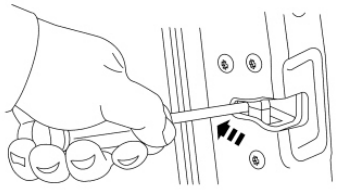
- Wiring, terminals or connectors
- Right rear door center latch
- Cargo door lock relay
- GEM

PINPOINT TEST C: THE CARGO DOOR LOCK IS INOPERATIVE

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

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
C1 CHECK THE DOOR LOCK OPERATION	
• Lock and unlock the doors using a door lock lever. • **Do the front door locks operate?**	**Yes** GO to C2 . **No** GO to Pinpoint Test A .
C2 CHECK THE CARGO DOOR LOCK RELAY	
• Install a known good relay in the cargo door lock relay location. • Enter the following diagnostic mode on the scan tool: GEM DataLogger . • Select the GEM PIDs (RELEASE) and (CTRL_LOCK). Active command the rear cargo door to unlock and lock. • **Does the cargo door unlock and lock when active commanded?**	**Yes** INSTALL a new cargo door lock relay. TEST the system for normal operation. **No** GO to C3 .
C3 CHECK FOR VOLTAGE TO THE CARGO DOOR LOCK RELAY	
• Disconnect: Cargo Door Lock Relay . • Measure the voltage between the cargo door lock relay pin 5, circuit 30-AA27 (RD), CJB face side and ground.  N0104966 • **Is the voltage greater than 10 volts?**	**Yes** GO to C4 . **No** REPAIR circuit 30-AA27 (RD) for an open. TEST the system for normal operation.

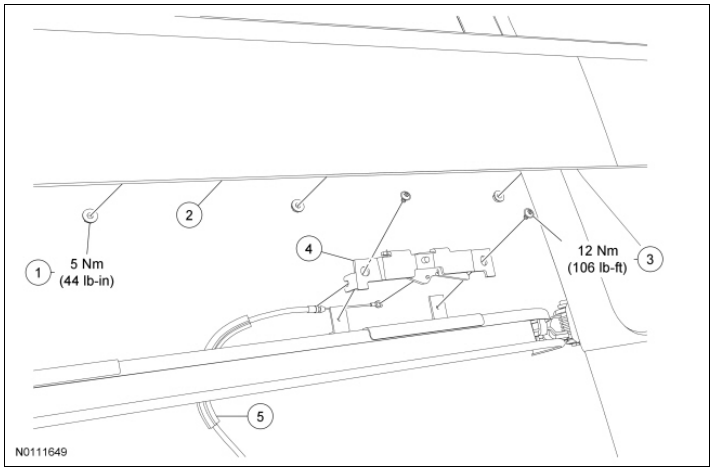
S1 CHECK FOR ANY LOOSE COMPONENTS	
• Remove the door trim panel. Refer to Section 501-05 . • Inspect inside the door for any loose components. • **Are there any loose components inside the door?**	**Yes** REPAIR as necessary. TEST the system for normal operation. **No** GO to S2 .
S2 CHECK THE STRIKER ADJUSTMENT	
• Check the adjustment of the striker. Refer to Section 501-03 . • **Is the striker adjusted correctly?**	**Yes** GO to S3 . **No** ADJUST the striker as necessary. TEST the system for normal operation.
S3 CHECK THE DOOR ALIGNMENT	
• Check the alignment of the door. Refer to Section 501-03 . • **Is the door aligned correctly?**	**Yes** GO to S4 . **No** ADJUST the door as necessary. TEST the system for normal operation.
S4 CHECK THE LATCH OPERATION AFTER LUBRICATION	
• Lubricate the door latch. Refer to Latch Lubrication in this section. • Using a screwdriver, fully close the latch (2 clicks).  N0094195 • Operate the door latch and listen for the noise. • **Is the original noise still present after the latch is lubricated?**	**Yes** INSTALL a new door latch. REFER to Front Door Latch , Sliding Door Latch or Rear Door Latch - Center, RH in this section. TEST the system for normal operation. **No** The concern was caused by an insufficiently lubricated door latch.

Pinpoint Test T: Ignition Key Cannot Be Returned To OFF Position

Refer to Wiring Diagrams Cell 37 , Shift Interlock for schematic and connector information.

Sliding Door Travel Limiting Latch

Removal



Item	Part Number	Description
1	W520100	Track Cover Nut (3 required)
2	25030	Cover- Body Side Sliding Door Track
3	W706684	Sliding Door Travel Limiting Latch bolts (2 required)
4	246A06B	Sliding Door Travel Limiting Latch
5	246A06A	Sliding Door Travel Limiting Latch Cable Assembly

1. Remove the RH sliding door track cover retaining nuts.

2. Remove the RH sliding door track cover.

3. Remove the sliding door travel limiting latch.
   - Remove the sliding door travel limiting latch bolts.
   - Disconnect the sliding door travel limiting latch cable assembly.

Installation

1. Install the sliding door travel limiting latch.
   - Connect the sliding door travel limiting latch cable assembly.
   - Tighten bolts to 12Nm (106 lb-in).

2. Install the RH sliding door track cover.

3. Install the RH sliding door track cover retaining nuts.
   - Tighten to 5Nm (44 lb-in).

Door Lock Cylinder - Sliding

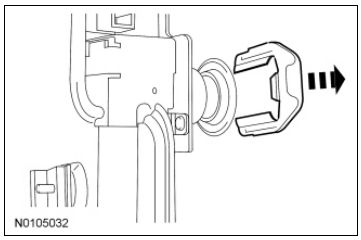
Removal and Installation

1. If equipped with power door locks, remove the Central Junction Box (CJB) fuse 163 (20A) to prevent the Generic Electronic Module (GEM) from actuating the door locks.

2. Remove the sliding cargo door trim panel. For additional information, refer to the Sliding Cargo Door Trim exploded view In Section Section 501-05 .

3. Position the water shield aside.

4. Remove the sliding cargo door lock cylinder retaining clip.

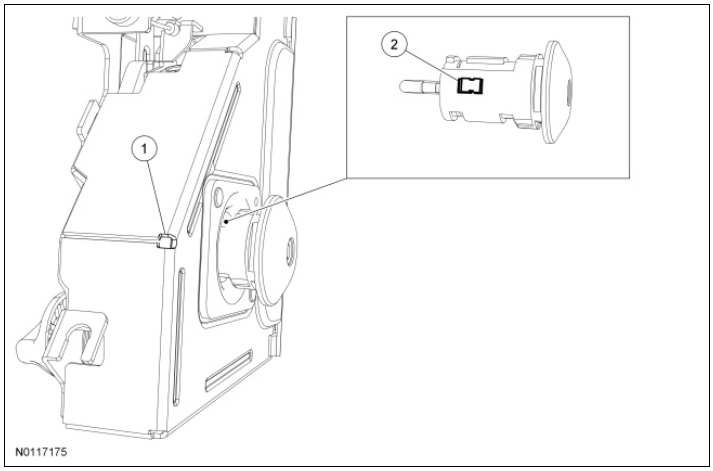


5. Insert the key into the sliding cargo door lock cylinder and rotate it clockwise.

6. **NOTE:** Sliding door not shown for clarity.

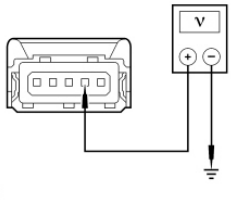
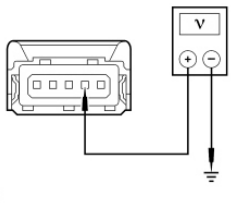
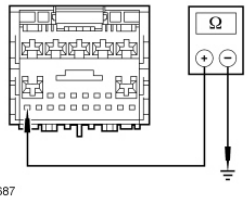
   Release the sliding cargo door lock cylinder locking pin.

   1. Insert a small flat-blade screwdriver or a suitable tool, into the access gap.
   2. Press in the sliding cargo door lock cylinder locking pin.



7. Rotate the sliding cargo door lock cylinder counterclockwise.

8. Pull outward and remove the sliding cargo door lock cylinder.

 N0105686 • **Is any voltage present?**	
C4 CHECK FOR A SHORT TO VOLTAGE AT THE HIGH-SPEED FEED CIRCUIT TO THE WIPER MOTOR	
• Ignition OFF. • Disconnect: GEM C201A . • Ignition ON. • Measure the voltage between windshield wiper motor C125-4, circuit 32-KA11 (WH/BK), harness side and ground.  N0105686 • **Is any voltage present?**	**Yes** REPAIR circuit 32-KA11 (WH/BK) for a short to voltage. TEST the system for normal operation. **No** GO to C5 .
C5 CHECK THE HIGH-SPEED WIPER/WASHER SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND	
• Ignition OFF. • Disconnect: GEM C201C . • Measure the resistance between GEM C201C-23, circuit 91S-KA11 (BK/RD), harness side and ground.  N0105687 • **Is the resistance greater than 10,000 ohms?**	**Yes** GO to C13 . **No** GO to C6 .
C6 CHECK THE HIGH-SPEED WIPER/WASHER INPUT CIRCUIT FOR A SHORT TO GROUND	

3. Pull the reservoir away from the vehicle.
4. Lower the reservoir from the vehicle.

Washer pump only

6. Remove the washer pump from the fluid reservoir.

Washer pump or fluid reservoir

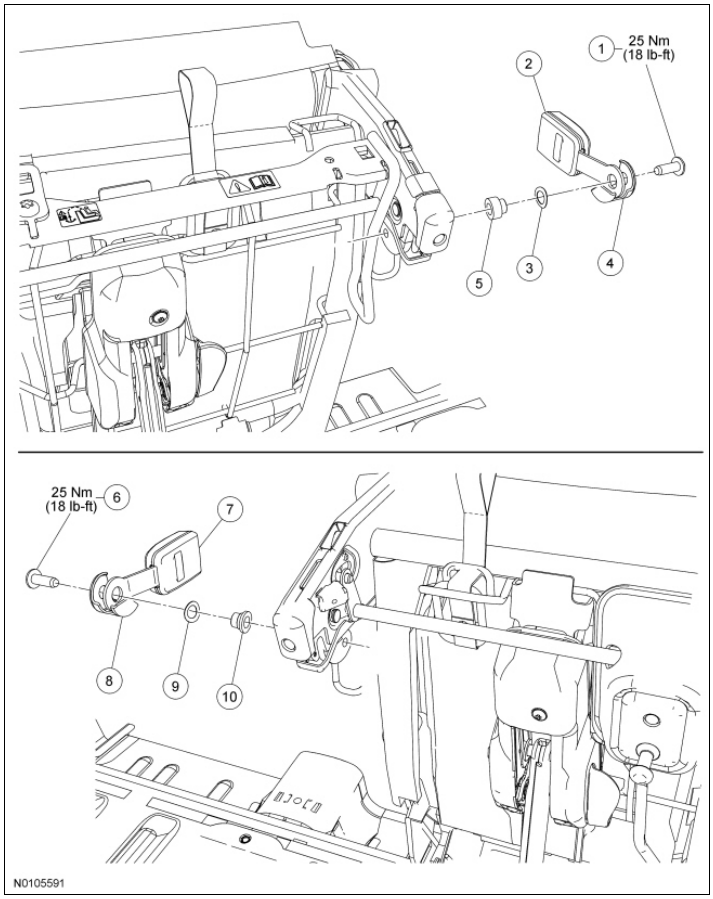
7. ***NOTICE:*** **Do not operate the washer pump prior to filling the washer reservoir. Failure to follow this instruction may result in premature washer pump failure.**

   To install, reverse the removal procedure.

   - Fill the washer reservoir with windshield washer fluid.

Safety Belt Buckle - Rear, Center and RH

NOTE: The upper graphic shows center safety belt buckle, lower graphic shows RH safety belt buckle.



Item	Part Number	Description
1	00813	Safety belt buckle bolt
2	60045	Center safety belt buckle
3	00810	Washer
4	67202	Safety belt buckle bolt cover
5	610D00	Spacer
6	00813	Safety belt buckle bolt
7	60045	RH safety belt buckle
8	67202	Safety belt buckle bolt cover
9	00810	Washer
10	610D00	Spacer

Removal and Installation

⚠ WARNING: After a crash, the following safety belt components and attaching hardware must be inspected and tested to verify cor function:

- Retractors
- Buckles

	Short to Battery	
B1916	Air Bag Driver Circuit Short to Battery	GO to Pinpoint Test G .
B1925	Air Bag Passenger Circuit Short to Battery	GO to Pinpoint Test Q .
B1932	Air Bag Driver Circuit Open	GO to Pinpoint Test R .
B1933	Air Bag Passenger Circuit Open	GO to Pinpoint Test S .
B1934	Air Bag Driver Inflator Circuit Resistance Low on Squib	GO to Pinpoint Test R .
B1935	Air Bag Passenger Inflator Circuit Resistance Low on Squib	GO to Pinpoint Test S .
B1936	Air Bag Driver Circuit Short to Ground	GO to Pinpoint Test T .
B1938	Air Bag Passenger Circuit Short to Ground	GO to Pinpoint Test U .
B1992	Driver Side, Side Mount Airbag Circuit Short to Vbatt	GO to Pinpoint Test V .
B1993	Driver Side, Side Mount Airbag Circuit Short to Ground	GO to Pinpoint Test W .
B1994	Driver Side, Side Mount Airbag Circuit Open	GO to Pinpoint Test X .
B1995	Driver Side, Side Mount Airbag Circuit Low Resistance on Squib	GO to Pinpoint Test X .
B1996	Passenger Side, Side Mount Airbag Circuit Short to Vbatt	GO to Pinpoint Test Y .
B1997	Passenger Side, Side Mount Airbag Circuit Short to Ground	GO to Pinpoint Test Z .
B1998	Passenger Side, Side Mount Airbag Circuit Open	GO to Pinpoint Test AA .
B1999	Passenger Side, Side Mount Airbag Circuit Low Resistance on Squib	GO to Pinpoint Test AA .
B2226	Front Crash Sensor Internal Fault	INSTALL a new LH front impact severity sensor. REFER to Front Impact Severity Sensor in this section.
B2227	Front Crash Sensor Driver Communications Fault	GO to Pinpoint Test AB .
B2228	Air Bag Driver Circuit Short to Ground - Loop #2	GO to Pinpoint Test AC .
B2229	Air Bag Passenger Circuit Short to Ground - Loop #2	GO to Pinpoint Test AD .

required. Failure to follow these instructions may result in serious personal injury.

NOTE: For air bag modules with multiple loops, all the loops on the air bag module must be deployed.

NOTE: Some driver and passenger front air bags have 2 deployment stages. After a collision it is possible that Stage 1 has deployed and Stage 2 has not.

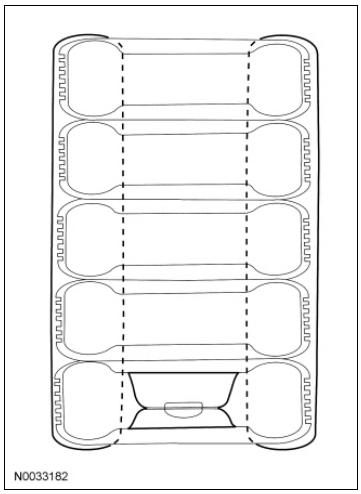
If a front air bag module has deployed, it is **mandatory** that the front air bag module be remotely deployed using the appropriate air bag disposal procedure.

NOTE: A typical air bag disposal is shown that is similar for all vehicles.

All driver, passenger and seat side air bag modules

1. Make a container to house the air bag module for deployment.
   - **NOTE:** The tires must be of sufficient size to accommodate the air bag module.

     Obtain a tire and wheel assembly and an additional 4 tires (without wheels) of the same size.
   - With the tire and wheel assembly on the bottom, stack the tires.
   - Securely tie all of the tires together.



2. Depower the SRS . For additional information, refer to Supplemental Restraint System (SRS) Depowering and Repowering in the General Procedures portion of this section.

3. Remove the air bag module. For additional information, refer to the appropriate procedure in this section.

4. **NOTE:** If the air bag module does not have a hard-wired pigtail, it will be necessary to cut the wires and connector(s) from the vehicle wire harness and reconnect to the air bag module.

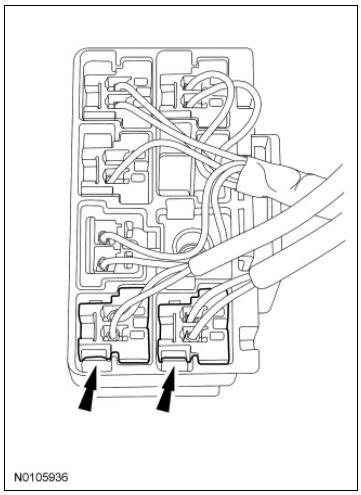
   Cut each of the air bag module wires near the electrical connector that connects to the vehicle wire harness.

5. Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.

6. **NOTE:** Typical driver air bag module with 2 loops shown, other air bag modules with multiple loops similar.

   For air bag modules with multiple loops, twist together a wire from each loop then repeat for the remaining wires from each loop.

6. Install the brown safety belt buckle electrical connector and yellow side air bag connector to the seat electrical bulkhead connector.



7. Install the wire harness.
   - Install the wire harness and retainers to the seat track.
   - Attach the seat electrical bulkhead connector to the seat track.

8. Install the cushion cover and all hog rings to the foam pad.

9. Fasten all cushion cover J-clips.

10. Install the inboard side shield and screw.
    - Attach the safety belt buckle wire harness.

11. Install the outboard side shield and screw.

12. If equipped, install the height adjust handle.

13. Install the recliner handle and screw.

14. Install the passenger seat. For additional information, refer to the Removal and Installation portion of Section 501-10 .

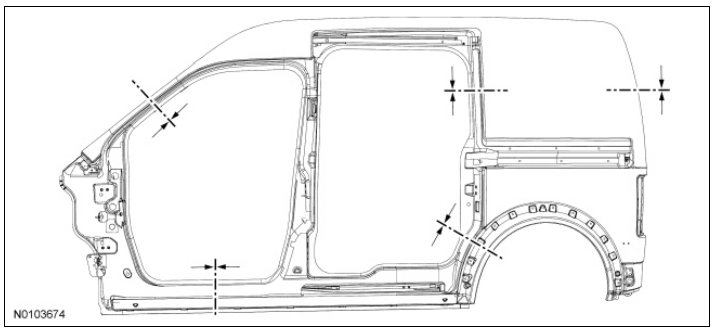
15. ***NOTICE:*** **To prevent system failure, it is necessary to carry out the Occupant Classification System (OCS) system reset when a front passenger seat cushion is disassembled, a new trim cover is installed or an OCS system service kit is installed. A scan tool is used to carry out the OCS system reset.**

    Make sure no Occupant Classification System Module (OCSM) DTCs are present. If DTC C1941 has been stored in OCSM memory it will clear upon a successful system reset. All other OCS system DTCs must be diagnosed and repaired before carrying out the OCS system reset.

16. ⚠ **WARNING: Make sure the front passenger seat repair is complete, the seat and all attached components (head restraint, seat side shield, etc.) are correctly assembled, and the seat is correctly installed to the vehicle before using System Reset to rezero the seat weight. Failure to follow these instructions may result in incorrect operation of the occupant classification system (OCS) and increases the risk of serious personal injury or death in a crash.**

    NOTICE: **To prevent system failure, the following precautions must be taken before carrying out the Occupant Classification System (OCS) system reset:**

vehicle occupant(s).



⚠ WARNING: Collision damage repair must conform to the instructions contained in this workshop manual. Replacement components must be new, genuine Ford Motor Company parts. Recycled, salvaged, aftermarket or reconditioned parts (including body parts, wheels or safety restraint components) are not authorized by Ford.

Departure from the instructions provided in this manual, including alternate repair methods or the use of substitute components, risks compromising crash safety. Failure to follow these instructions may adversely affect structural integrity and crash safety performance, which could result in serious personal injury to vehicle occupants in a crash.

1. ***NOTICE:*** **Electronic modules and related wiring may be damaged when exposed to heat from welding procedures. Carefully disconnect and remove, or position away from heat affected areas.**

   NOTE: When it is necessary to carry out weld-bonding procedures, refer to Weld-Bonding in this section.

   Detrim the vehicle as necessary and drill out the spot welds from the damaged area. Using an air chisel or reciprocating saw, cut off the portion of the panel to be replaced.

2. Where possible, create a backer piece using a portion of the old panel. This will create a stronger joint.

3. When welding overlapping surfaces or substrates, apply a high quality weld-through primer between the surfaces prior to welding.
   - Make sure horizontal joints and flanges are correctly sealed with seam sealer to prevent moisture intrusion. Water and moisture migrate to horizontal joints and corrosion tends to occur more rapidly in these areas. Metal surfaces must be clean and dry before applying seam sealer.

4. Proceed with refinish procedures following Ford-approved paint guidelines.

5. Apply corrosion protection as necessary to repair area.

Front Side Member and Fender Apron Panel

1. Remove the hood and hood hinge.

2. Remove the fender(s) from the affected side(s). For additional information, refer to Section 501-02 .

3. Remove the windshield. For additional information, refer to Section 501-11 .

- Engine noise, front of engine - ticking, tapping or rattling noise from the front of the engine
- Timing drive components
- REMOVE the accessory drive belt. REFER to Section 303-05 .
- USE the EngineEAR to isolate the noise to the engine front cover.
- REMOVE the engine front cover and INSPECT the timing drive components. INSTALL new parts as necessary. REFER to Section 303-01 . TEST the system for normal operation after the repair.
- Engine noise, upper end - ticking noise near the fuel rail and intake manifold
- Fuel rail clip
- CHECK for loose or damaged fuel rail clip(s). REPAIR as necessary. TEST the system for normal operation after the repair.
- Fuel injector
- USE the EngineEAR to isolate the noisy injector(s). INSTALL a new injector(s) as necessary. REFER to Section 303-04 . TEST the system for normal operation after the repair.
- Engine noise, upper end - occurs mostly with a warm engine at light/medium acceleration
- Worn or damaged spark plugs
- REMOVE the spark plugs. INSPECT and INSTALL new as necessary. REFER to Section 303-07 . TEST the em for normal operation after the repair.
- Carbon accumulation in combustion chamber
- Bore scope the cylinder. ELIMINATE carbon buildup. TEST the system for normal operation after the repair.
- Engine noise, upper end - rattling noise from the valve train. Worse when the engine is cold
- Low oil level
- CHECK the oil level. FILL as necessary.
- Thin or diluted oil
- INSPECT the oil for contamination. If the oil is contaminated, CHECK for the source. REPAIR as necessary. CHANGE the oil and filter. TEST the system for normal operation after the repair.
- Low oil pressure
- CARRY OUT an oil pressure test. If not within specifications, REMOVE the engine oil pan. REFER to Section 303-01 . INSPECT for a blocked oil pick up tube. TEST the system for normal operation after the repair.
- Worn valve train components
- CARRY OUT the Valve Train Analysis Component Test in this section. INSTALL new parts as necessary. TEST the system for normal operation after the repair.

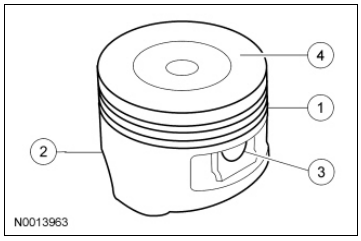
Piston Inspection

Special Tool(s)

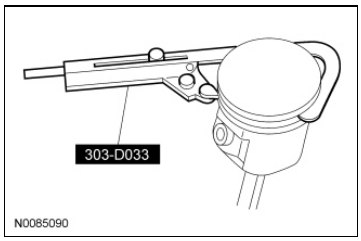
 ST1279-A	Scraper, Piston Ring Groove 303-D033 (D81L-6002-D) or equivalent

NOTICE: **Do not use a caustic cleaning solution or a wire brush to clean the pistons or damage can occur.**

1. Clean and inspect the (1) ring lands, (2) skirts, (3) pin bosses and the (4) tops of the pistons. If wear marks, scores or glazing is found on the piston skirt, check for a bent or twisted connecting rod.



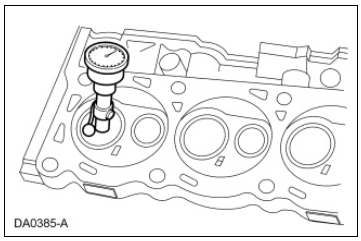
2. Use the Piston Ring Groove Scraper to clean the piston ring grooves.
   - Make sure the oil ring holes are clean.



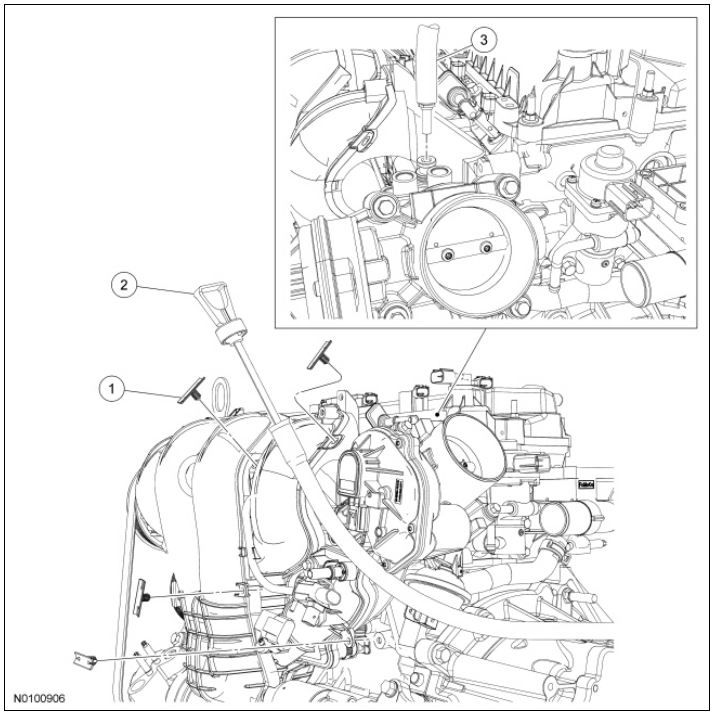
Valve Seat Runout

NOTE: Refer to the appropriate Section 303-01 for the specification.

1. Use a valve seat runout gauge to check valve seat runout.

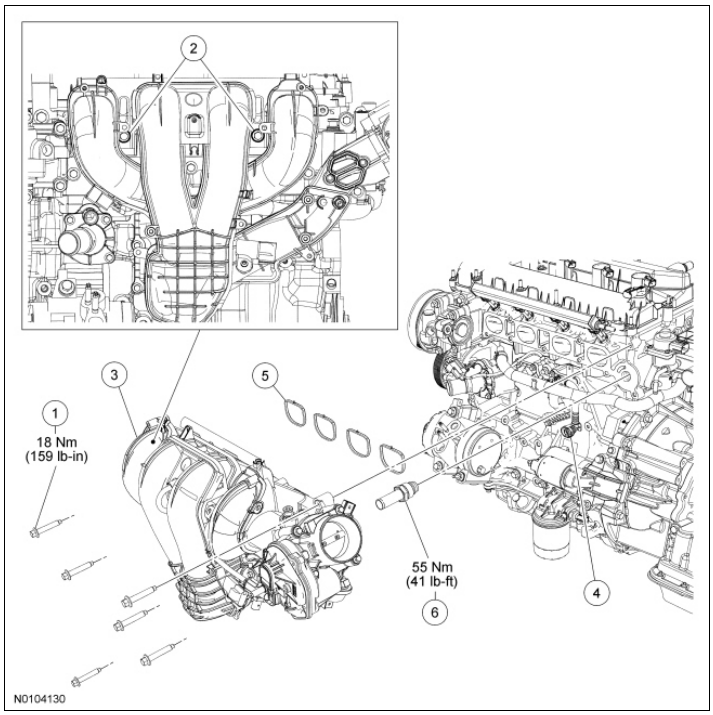


&np;

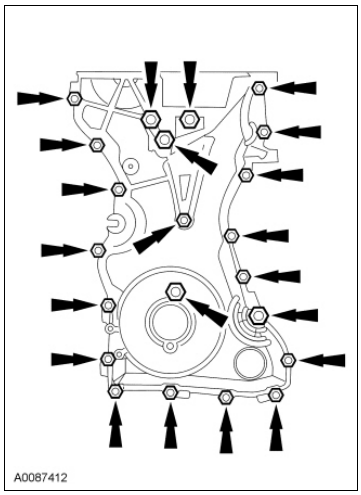


Item	Part Number	Description
1	13A506	Wire harness pin-type retainer (part of 12C508) (4 required)
2	7A020	Transaxle fluid indicator
3	19D848	Power brake booster vacuum tube

Intake Manifold (View 3 of 3)



7. Remove the 3 bolts and the coolant pump pulley.
8. Remove the coolant degas bottle. For additional information, refer to Section 303-03 .
9. Remove the power steering pump. For additional information, refer to Section 211-02 .
10. Remove the engine mount. For additional information, refer to Engine Mount in this section.
11. Slightly raise the engine for access to the accessory drive idler pulley.
12. Remove the accessory drive idler pulley. For additional information, refer to Section 303-05 .
13. Remove the bolts and the engine front cover.



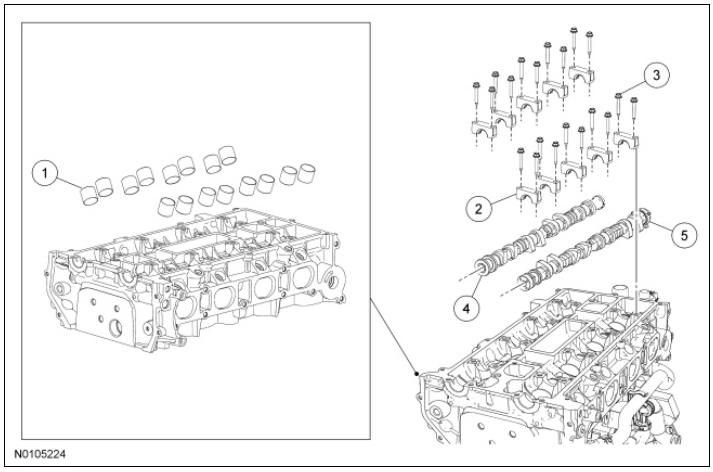
Installation

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 and inspect the mounting surfaces of the engine and the front cover.

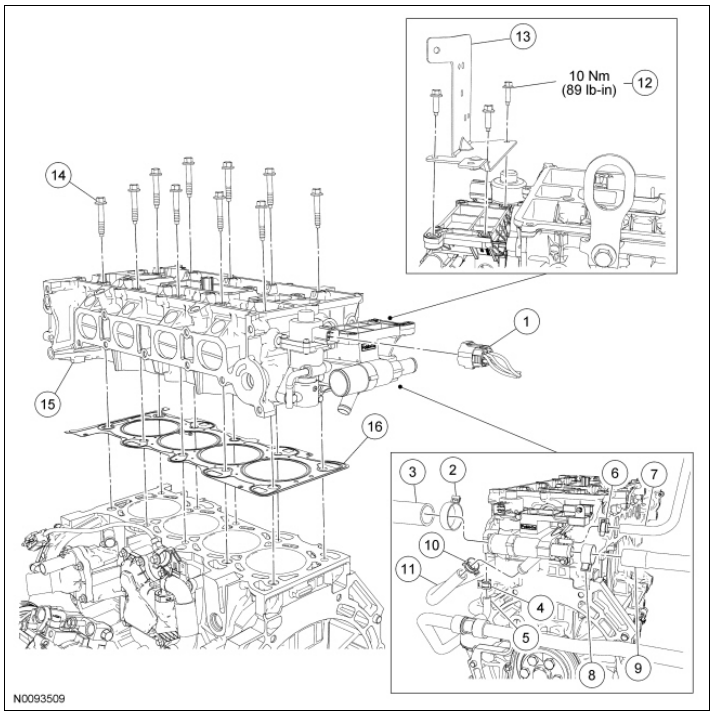
2. **NOTE:** The engine front cover must be installed and the bolts tightened within 4 minutes of applying the silicone gasket and sealant.

   Apply a 2.5 mm (0.10 in) bead of silicone gasket and sealant to the cylinder head and oil pan joint areas. Apply a 2.5 mm (0.10 in) bead of silicone gasket and sealant to the front cover.



Item	Part Number	Description
1	6500	Valve tappet (16 required)
2	6A284	Camshaft bearing cap (10 required)
3	W703383	Camshaft bearing cap bolt (20 required)
4	6A272	Exhaust camshaft
5	6A267	Intake camshaft

Cylinder Head (View 2 of 2)



Item	Part Number	Description
1	14A464	EGR valve electrical connector (part of 12B637)
2	8287	Upper radiator hose clamp
3	8260	Upper radiator hose
4	W52592	EGR coolant tube clamp
5	18K580	EGR coolant hose (part of heater hose)

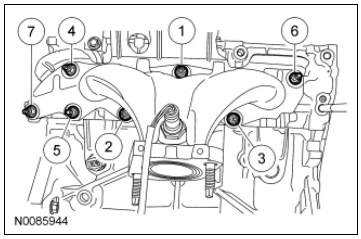
1. Install the 7 new exhaust manifold studs.
    - Tighten to 17 Nm (150 lb-in).

2. ***NOTICE:*** **Failure to tighten the catalytic converter nuts to specification before installing the converter bracket bolts will cause the converter to develop an exhaust leak.**

   NOTICE: **Failure to tighten the catalytic converter nuts to specification a second time may cause the converter to develop an exhaust leak. Due to the possibility of the catalytic converter nuts loosening after the first tightening sequence, a second sequence (stage 2) will ensure that the catalytic converter nuts are properly torqued.**

   Install a new exhaust manifold gasket, the exhaust manifold and 7 new nuts in the sequence shown in 2 stages:

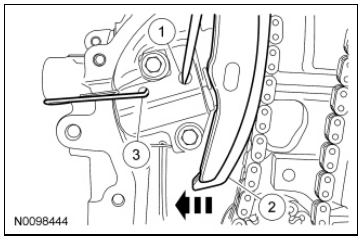
    - Stage 1: Tighten to 48 Nm (35 lb-ft).
    - Stage 2: Tighten to 48 Nm (35 lb-ft).



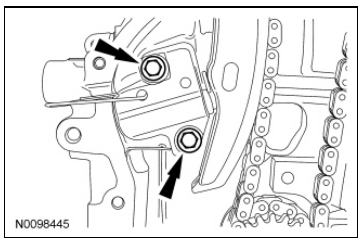
3. Install the exhaust manifold heat shield and the 4 bolts.
    - Tighten to 10 Nm (89 lb-in).

4. Connect the HO2S electrical connector.
    - Attach the wiring retainer.

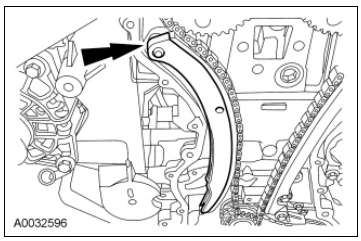
5. Install the catalytic converter. For additional information, refer to Section 309-00 .



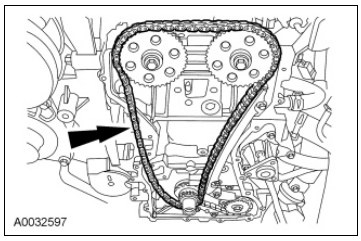
48. Remove the 2 bolts and the timing chain tensioner.



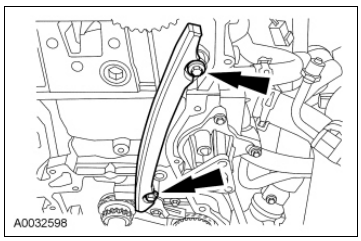
49. Remove the RH timing chain guide.



50. Remove the timing chain.

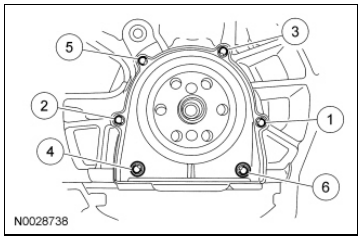


51. Remove the 2 bolts and the LH timing chain guide.



52. ***NOTICE:*** **Do not rely on the Camshaft Alignment Plate to prevent camshaft rotation. Damage to the tool or the camshaft can occur.**

    Using the flats on the camshaft to prevent camshaft rotation, remove the bolts and the camshaft sprockets.

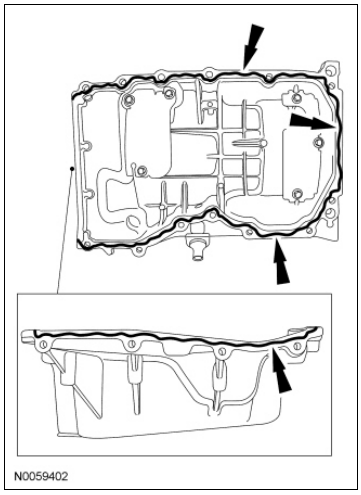


27. *NOTICE:* **Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.**

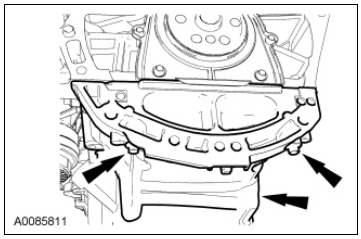
    Clean and inspect all mating surfaces.

28. **NOTE:** If the oil pan is not secured within 4 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 4 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

    Apply a 2.5 mm (0.09 in) bead of silicone gasket and sealant to the oil pan-to-engine block and to the oil pan-to-engine front cover mating surface.

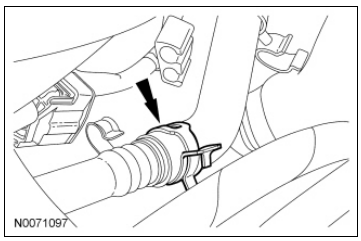


29. Install the oil pan. Install the 2 oil pan bolts finger-tight.

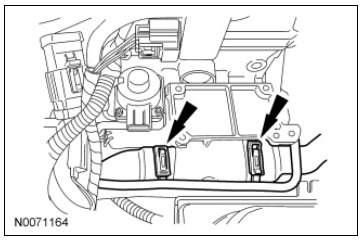


30. Using a suitable straight edge, align the front surface of the oil pan flush with the front surface of the engine block.

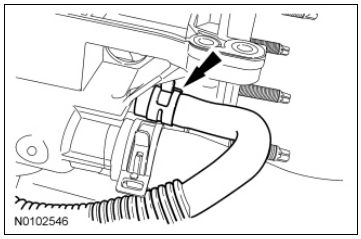
32. Connect the heater hose to the coolant tube.



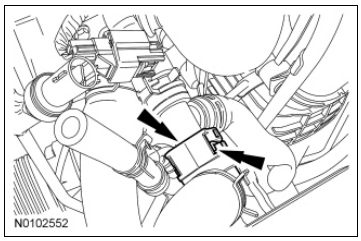
33. Connect the upper radiator hose and the heater hose to the coolant bypass.



34. Connect the coolant degas bottle vent hose to the coolant bypass.



35. Connect the coolant degas bottle hose and install the retaining clip.

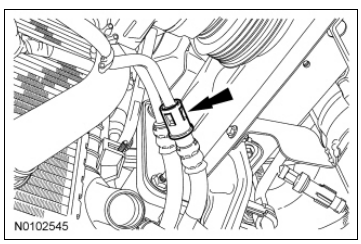


36. Install the power steering pump. For additional information, refer to Section 211-02 .

37. Clean and inspect the exhaust manifold flange. For additional information, refer to Exhaust Manifold Cleaning and Inspection in Section 303-00 .

38. Install the exhaust manifold. For additional information, refer to Exhaust Manifold in this section.

39. Connect the power steering cooler tube.



NOTE: Less than 80% of coolant capacity can be recovered with the engine in the vehicle. Dirty, rusty or contaminated coolant requires replacement.

Release the pressure in the cooling system by slowly turning the pressure relief cap one-half turn counterclockwise. When the pressure is released, remove the pressure relief cap.

3. Place a suitable container below the radiator drain valve.
    - Open the radiator drain valve and allow the coolant to drain.
    - Cose the radiator drain valve.

Filling and Bleeding with a Vacuum Cooling System Filler

NOTICE: **Engine coolant provides boil protection, corrosion protection, freeze protection, and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle.**

To maintain the integrity of the coolant and the cooling system:

- Add Motorcraft® Specialty Orange Engine Coolant or equivalent meeting Ford specification WSS-M97B44-D. Do not mix coolant types.
- Do not add or mix with any other type of engine coolant. Mixing coolants may degrade the coolant's corrosion protection.
- Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.
- Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft® Specialty Orange Engine Coolant since a Ford-approved recycling process is not yet available.

1. Install the vacuum cooling system filler and follow the manufacturer's instructions to fill and bleed the cooling system.
    - Recommended coolant concentration is 50/50 engine coolant to distilled water.
    - For extremely cold climates (less than -37°C [-34°F]):
        - ♦ It may be necessary to increase the coolant concentration above 50%.
        - ♦ NEVER increase the coolant concentration above 60%.
        - ♦ Maximum coolant concentration is 60/40 for cold weather areas.
        - ♦ A coolant concentration of 60% provides freeze point protection down to -50°C (-58°F).
        - ♦ Engine coconcentration above 60% decreases the overheat protection characteristics of the engine coolant and may damage the engine.
    - For extremely hot climates:
        - ♦ It is still necessary to maintain the coolant concentration above 40%.
        - ♦ NEVER decrease the coolant concentration below 40%.
        - ♦ Minimum coolant concentration is 40/60 for warm weather areas.
        - ♦ A coolant concentration of 40% provides freeze point protection down to -26°C (-15°F).
        - ♦ Engine coolant concentration below 40% decreases the corrosion and freeze protection characteristics of the engine coolant and may damage the engine.
    - Vehicles driven year-round in non-extreme climates should use a 50/50 mixture of engine coolant and distilled water for optimum cooling system and engine protection.

Fuel Injectors

Removal and Installation

1. The fuel injectors are serviced with the fuel rail. For additional information, refer to Fuel Rail and Fuel Injector - Exploded View and Fuel Rail in this section.

- Starter motor
- Starter motor mounting
- Starter motor engagement
- Flexplate ring gear

PINPOINT TEST C: UNUSUAL STARTER NOISE

Test Step	Result / Action to Take
C1 CHECK THE STARTER MOUNTING	
• Inspect the starter motor mounting bolts for looseness. • **Is the starter motor mounted correctly?**	**Yes** GO to C2 . **No** INSTALL the starter motor correctly. REFER to Starter Motor in this section. TEST the system for normal operation.
C2 CHECK FOR ENGINE NOISE	
• Turn the ignition switch to the OFF position. • Connect a remote starter switch between the starter solenoid "B" and "S" terminals. • Engage the starter and verify the noise is due to starter operation. • **Is the noise due to the starter motor engagement?**	**Yes** GO to C3 . **No** REFER to Section 303-00 to continue the diagnosis.
C3 CHECK FOR UNUSUAL WEAR	
• Remove the starter motor. Refer to Starter Motor in this section. • Inspect the flexplate ring gear for damaged or worn teeth. • **Is the noise due to flexplate ring gear tooth damage?**	**Yes** INSTALL a new flexplate. REFER to Section 303-01 . EXAMINE the starter pinion teeth. If damaged, INSTALL a new starter motor. REFER to Starter Motor in this section. TEST the system for normal operation. **No** INSTALL a new starter motor. REFER to Starter Motor in this section. TEST the system for normal operation.

Component Tests

⚠ **WARNING: Always disconnect the battery ground cable at the battery before disconnecting the starter motor battery terminal lead. If a tool is shorted at the starter motor battery terminal, the tool can quickly heat enough to cause a skin burn. Failure to follow this instruction may result in serious personal injury.**

Air Cleaner

1. Disconnect the Mass Air Flow (MAF) sensor electrical connector.

2. Loosen the clamp and disconnect the Air Cleaner (ACL) outlet pipe from the ACL cover.
   - To install, tighten to 3 Nm (27 lb-in).

3. Remove the 2 ACL assembly bolts.
   - To install, tighten to 8 Nm (71 lb-in).

4. **NOTE:** No tools are required to remove the ACL assembly. Removal should be carried out using hands only.

   Release the ACL assembly from the body isolator.

   - Remove the ACL assembly.

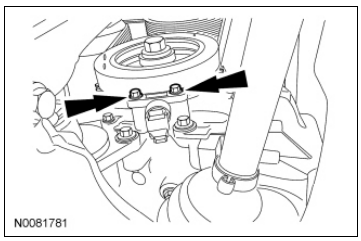
5. **NOTE:** Make sure the ACL assembly is seated into the body isolator.

   NOTE: The ACL outlet pipe should be securely sealed to prevent unmetered air from entering the engine.

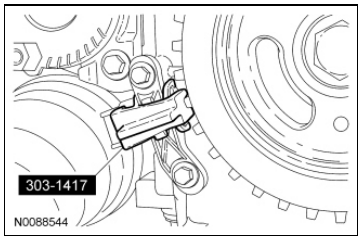
   To install, reverse the removal procedure.

Installation

1. Install the CKP sensor, but do not tighten the 2 bolts at this time.

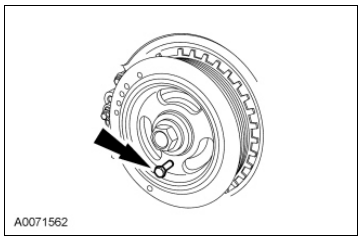


2. Using the Crankshaft Sensor Aligner, adjust the CKP sensor.
   - Tighten the 2 CKP sensor bolts to 7 Nm (62 lb-in).

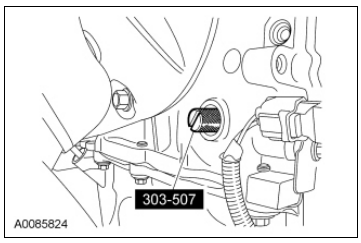


3. Connect the CKP sensor electrical connector.

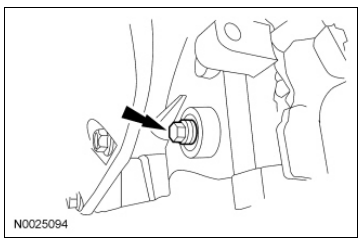
4. Remove the 6 mm x 18 mm bolt.



5. Remove the Crankshaft TDC Timing Peg.



6. Install the cylinder block plug.
   - Tighten to 20 Nm (177 lb-in).



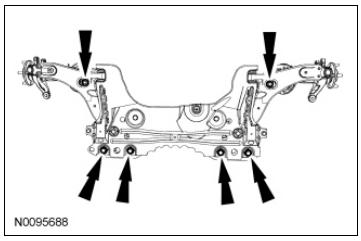
7. Install the accessory drive belt splash shield and the 2 bolts.

6. If equipped with Advance Track® and Roll Stability Control (RSC®), calibrate the ABS module.
    - Carry out the IVD Initialization sequence for the steering angle sensor. Follow the scan tool directions.

Cross Caster Adjustment

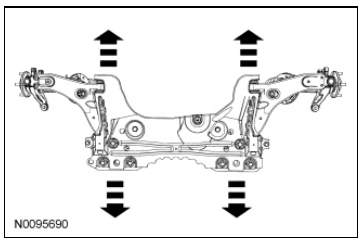
1. Using alignment equipment and the manufacturer's instructions, measure the caster settings.

2. Loosen the 4 subframe rearward bolts and the 2 subframe forward bolts approximately 2 or 3 turns (720-1080 degrees of rotation).



3. **NOTE:** Shifting the subframe forward will increase the caster. Shifting the subframe rearward will decrease the caster.

   Shift the subframe to change the cross caste needed.

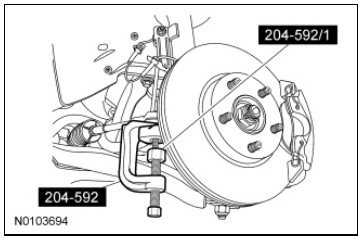


4. **NOTE:** Tightening the subframe bolts in the correct sequence will minimize subframe shifting.

   Tighten the 6 subframe bolts in the following sequence.

    1. Tighten the 2 rearward outboard bolts to 200 Nm (148 lb-ft).
    2. Tighten the 2 forward bolts to 125 Nm (92 lb-ft).
    3. Tighten the 2 rearward inboard bolts to 200 Nm (148 lb-ft).

5. If equipped with Advance Track® and Roll Stability Control (RSC®), calibrate the ABS module.
    - Carry out the IVD Initialization sequence for the steering angle sensor. Follow the scan tool directions.

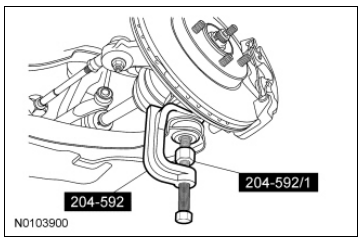


10. **NOTE:** Use the hex-holding feature when removing or installing the lower ball joint nut.

    Remove and discard the ball joint nut.

11. ***NOTICE:*** **Do not use a prying device or separator fork between the ball joint and the wheel knuckle. Damage to the ball joint or ball joint seal may result.**

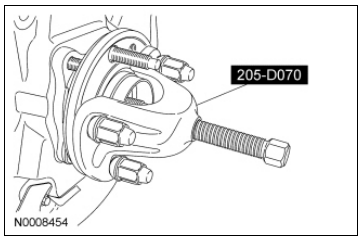
    Using the Ball Joint Separator and Adapter, separate the ball joint from the wheel knuckle.



12. ***NOTICE:*** **The inner Constant Velocity (CV) joint must not be bent more than 18 degrees and the outer CV joint must not be bent more than 45 degrees or damage to the halfshaft may occur.**

    Using the Front Wheel Hub Remover, press out the halfshaft from the wheel hub and detach the halfshaft from the wheel hub.

    - Support the halfshaft.



13. Remove and discard the wheel knuckle-to-strut bolt.

14. Remove the wheel knuckle.

Installation

1. ***NOTICE:*** **The wheel knuckle-to-strut bolt is tightened in 2 stages. Failure to follow these instructions may result in incorrect clamp load and component damage.**

   Position the wheel knuckle and install a new wheel knuckle-to-strut bolt.

   - Stage 1: Tighten to 100 Nm (74 lb-ft).
   - Stage 2: Tighten an additional 90 degrees.

Wheels And Tires

Safety Precautions

⚠ WARNING: Vehicle may have multiple drive wheels. Do not use engine to power the driveline unless all drive wheels are elevated off the ground. Drive wheels in contact with ground could cause unexpected vehicle movement. Failure to follow this instruction may result in serious personal injury.

⚠ WARNING: Always match the tire size to the wheel size during assembly. Incorrect matching can result in tire bead damage or tire separation from the wheel. Failure to follow this instruction may result in serious personal injury to technician or vehicle occupant(s).

⚠ WARNING: Before servicing any tire, ask the customer if anyone injected a tire sealant into the tire. Tire sealants may be flammable and can burn or explode if exposed to an ignition source. Failure to follow this instruction may result in serious personal injury.

⚠ WARNING: Replacement wheels must be equivalent to the original equipment wheels in:

- load carrying capacity.
- diameter, width and offset.
- pilot hole and bolt circle.

Combined load carrying capacity of replacement wheels for a given axle, must be equal to or greater than that axle's gross axle weight rating (GAWR) identified on the vehicle's Safety Compliance Certification label. All other specifications should be evaluated by measurement of both the original wheel and the replacement wheel. If specifications are not equivalent, the safety and handling of the vehicle may be degraded, which may result in serious injury to the vehicle occupant(s).

⚠ WARNING: Never use wheels different than the original equipment. Additionally, never use wheel nuts different than the original equipment. Failure to follow these instructions may result in damage to the wheel or mounting system. This damage could cause the wheel to come off while the vehicle is being driven, which could result in serious personal injury or death to vehicle occupant(s).

⚠ WARNING: Always wear eye protection when servicing a vehicle. Failure to follow this instruction may result in serious personal injury.

⚠ WARNING: Keep eyes away from valve stem when deflating tires. Reduce air pressure in tire as much as possible by pushing in valve core plunger prior to removing the core. Escaping air can carry particles that can injure the eyes. Failure to follow these instructions may result in serious personal injury.

⚠ WARNING: Only use replacement tires that are the same size, load index, speed rating and type (such as P-metric versus LT-metric or all-season versus all-terrain) as those originally provided by Ford. The recommended tire and wheel size may be found on either the Safety Compliance Certification Label or the Tire Label, which is located on the B-pillar or edge of the driver's door. If the information is not found on these labels, consult a Ford dealer. Use of any tire or wheel not recommended by Ford can affect the safety and performance of the vehicle, which could result in an increased risk of loss of vehicle control, vehicle rollover, personal injury and death. Additionally, the use of non-recommended tires and wheels could cause steering, suspension, axle or transfer case/power transfer unit failure.

Pinpoint Test E: DTC B1317

Normal Operation

The Tire Pressure Monitoring System (TPMS) monitors the voltage from the battery to determine if it goes above or below specific thresholds. DTC B1317 sets in continuous memory if the TPMS detects high battery voltage above 16 volts.

- DTC B1317 (Battery Voltage High) - sets if the voltage supplied to the TPM /Vehicle Security Module (VSM) exceeds 16 volts during the TPM / VSM self-test or normal operation, with vehicle speed greater than 5 km/h (3 mph).

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Charging system concern
- TPM / VSM

PINPOINT TEST E: DTC B1317

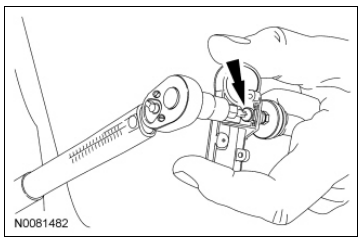
NOTE: DTC B1317 may be stored in the module memory due to past battery charging or vehicle jump starting events.

Test Step	Result / Action to Take
E1 CHECK FOR DTC B1317, B1676 OR P0563 SET IN OTHER MODULES	
• Ignition ON. • Enter the following diagnostic mode on the scan tool: Self-Test. • Retrieve the continuous memory DTCs from all modules. • **Is DTC B1317, B1676 or P0563 (PCM) set in more than one module?**	**Yes** REFER to Section 414-00 to diagnose an overcharging condition. **No** GO to E2 .
E2 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 15.5 volts or higher?**	**Yes** REFER to Section 414-00 to diagnose an overcharging condition. **No** GO to E3 .
E3 RECHECK FOR DTC B1317	
• Turn the engine off. • Ignition ON. • Enter the following diagnostic mode on the scan tool: TPM / VSM Self-Test.	**Yes** INSTALL a new TPM / VSM . REFER to Tire Pressure Monitor (TPM) Module in this section. TEST the system for normal operation. **No**

1. ***NOTICE:*** **To prevent Tire Pressure Monitoring System (TPMS) sensor and valve stem damage, the valve stem must be installed onto the TPMS sensor and then installed into the wheel as an assembly.**

   Install a new valve stem onto the TPMS sensor.

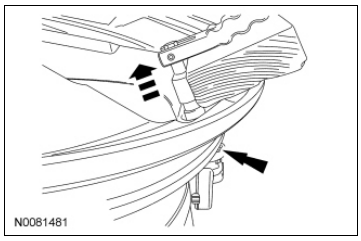
   - Tighten the new valve stem-to- TPMS sensor screw to 1.5 Nm (13 lb-in).



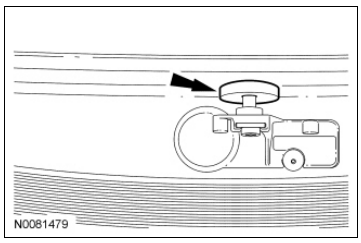
2. ***NOTICE:*** **It is important to pull the valve stem and Tire Pressure Monitoring System (TPMS) sensor assembly through the wheel rim hole in a direction parallel to the valve stem hole axis. If the assembly is pulled through at an angle, damage to the valve stem and sensor assembly may occur.**

   NOTICE: **Use care not to damage the wheel surface when installing the valve stem and Tire Pressure Monitoring System (TPMS) sensor assembly.**

   Lubricate the valve stem with soapy water and install the valve stem and TPMS sensor assembly into the wheel using a block of wood and a suitable valve stem installer.



3. Make sure the valve stem rubber is fully seated against the wheel.



4. **NOTE:** Lubricate the tire beads using a suitable fast-drying, corrosion-inhibiting tire bead lubricant.

   NOTE: Do not mount the tire at this time.

   Position the wheel on the turntable of the tire machine, then lubricate and position the bottom bead of the tire on the wheel.

5. Position the wheel to align the valve stem with the machine arm, at the 6 o'clock position, and mount the bottom bead of the tire.

Material

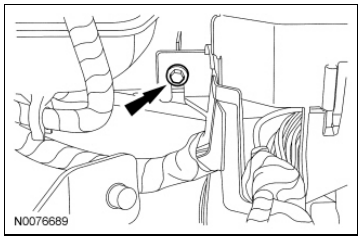
Item	Specification	Fill Capacity
Super DOT 4 Motor Vehicle Brake Fluid YS4Z-19542-AA	ESD-M6C57-A or WSS-M6C65-A2	800 ml (1.69 pt)
Metal Brake Parts Cleaner PM-4-A or PM-4-B (US); CPM-4 (Canada)	-	-
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A	-

General Specifications

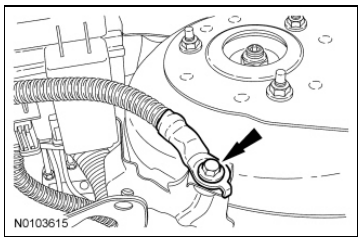
Item	Specification
Brake Disc	
Front brake disc minimum thickness	22 mm (0.866 in)
Brake Drum	
Maximum brake drum diameter	230.2 mm (9.062 in)
Brake Pads and Shoes	
Maximum brake shoe taper wear (in any direction)	3.0 mm (0.118 in)
Minimum brake shoe thickness	1 mm (0.039 in)
Minimum brake pad thickness	2.0 mm (0.078 in)

Torque Specifications

Description	Nm	lb-ft	lb-in
Brake caliper bleeder screw	8	-	71
Master cylinder brake tube fittings	23	17	-
Wheel cylinder bleeder screw	8	-	71



11. Position the battery ground cable and install the bolt.
    - Tighten the bolt to 10 Nm (89 lb-in).



12. Install the battery tray. For additional information, refer to Section 414-01 .

13. Bleed the brake system. For additional information, refer to Brake System Bleeding in this section.

Brake Caliper

⚠ WARNING: Do not use any fluid other than clean brake fluid meeting manufacturer's specification. Additionally, do not use brake fluid that has been previously drained. Following these instructions will help prevent system contamination, brake component damage and the risk of serious personal injury.

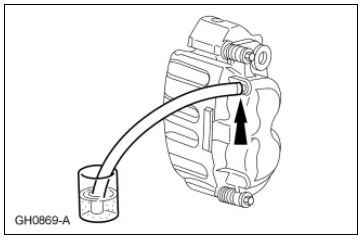
⚠ WARNING: Carefully read cautionary information on product label. For EMERGENCY MEDICAL INFORMATION seek medical advice. In the USA or Canada on Ford/Motorcraft products call: 1-800-959-3673. For additional information, consult the product Material Safety Data Sheet (MSDS) if available. Failure to follow these instructions may result in serious personal injury.

⚠ WARNING: Do not allow the brake master cylinder to run dry during the bleeding operation. Master cylinder may be damaged if operated without fluid, resulting in degraded braking performance. Failure to follow this instruction may result in serious personal injury.

NOTICE: **Do not spill brake fluid on painted or plastic surfaces or damage to the surface may occur. If brake fluid is spilled onto a painted or plastic surface, immediately wash the surface with water.**

NOTE: It is not necessary to do a complete brake system bleed if only the brake caliper was disconnected or installed new.

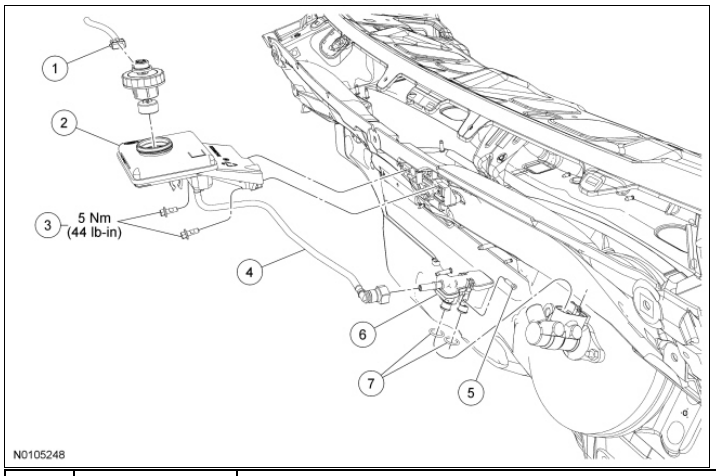
1. Remove the bleeder screw cap and place a box-end wrench on the bleeder screw. Attach a rubber drain hose to the bleeder screw and submerge the free end of the hose in a container partially filled with clean, specified brake fluid.



Brake Fluid Reservoir

Material

Item	Specification
Super DOT 4 Motor Vehicle Brake Fluid YS4Z-19542-AA	ESD-M6C57-A or WSS-M6C65-A2



Item	Part Number	Description
1	-	Brake fluid remote reservoir filler cap electrical connector (part of 14290)
2	2K478	Brake fluid remote reservoir
3	W704310	Brake fluid remote reservoir bolts (2 required)
4	-	Brake fluid remote reservoir-to-master cylinder tube (part of 2K478)
5	-	Brake fluid reservoir pin bolt (part of 2C246)
6	2C246	Brake fluid reservoir
7	-	Brake fluid reservoir seals (part of 2C246)

Removal and Installation

⚠ WARNING: Do not use any fluid other than clean brake fluid meeting manufacturer's specification. Additionally, do not use brake fluid that has been previously drained. Following these instructions will help prevent system contamination, brake component damage and the risk of serious personal injury.

⚠ WARNING: Carefully read cautionary information on product label. For EMERGENCY MEDICAL INFORMATION seek medical advice. In the USA or Canada on Ford/Motorcraft products call: 1-800-959-3673. For additional information, consult the product Material Safety Data Sheet (MSDS) if available. Failure to follow these instructions lt in serious personal injury.

NOTICE: **Do not spill brake fluid on painted or plastic surfaces or damage to the surface may occur. If brake fluid is spilled onto a painted or plastic surface, immediately wash the surface with water.**

• Make sure the connector is seated correctly, then operate the system and verify the concern is still present. • **Is the concern still present?**	CLEAR the DTCs. REPEAT the self-test.

Pinpoint Test B: DTC C0031:11, 15; C0034:11, 15; C0037:11, 15; or C003A:11, 15

Normal Operation

Active wheel speed sensors generate a square wave signal that is sent to the ABS module. The wheel speed sensor circuits are connected to the ABS module through 2 wires and a connector at each wheel speed sensor. When the ignition switch is turned to the RUN position, the ABS module carries out a self-test by sending a reference voltage through the wheel speed sensor circuits and sensors.

Both voltage and ground are supplied to the active wheel speed sensors through the ABS module.

DTC Description	Fault Trigger Conditions
• C0031:11 â Left Front Wheel Speed Sensor: Circuit Short To Ground	If the ABS module detects that the LF wheel speed sensor circuit is shorted to ground, this DTC will set.
• C0031:15 â Left Front Wheel Speed Sensor: Circuit Short To Battery or Open	If the ABS module detects that the LF wheel speed sensor circuit is shorted to battery voltage, is open or has high resistance, this DTC will set.
• C0034:11 â Right Front Wheel Speed Sensor: Circuit Short To Ground	If the ABS module detects that the RF wheel speed sensor circuit is shorted to ground, this DTC will set.
• C0034:15 â Right Front Wheel Speed Sensor: Circuit Short To Battery or Open	If the ABS module detects that the RF wheel speed sensor circuit is shorted to battery voltage, is open or has high resistance, this DTC will set.
• C0037:11 â Left Rear Wheel Speed Sensor: Circuit Short To Ground	If the ABS module detects that the LR wheel speed sensor circuit is shorted to ground, this DTC will set.
• C0037:15 â Left Rear Wheel Speed Sensor: Circuit Short To Battery or Open	If the ABS module detects that the LR wheel speed sensor circuit is shorted to battery voltage, is open or has high resistance, this DTC will set.
• C003A:11 â Right Rear Wheel Speed Sensor: Circuit Short To Ground	If the ABS module detects that the RR wheel speed sensor circuit is shorted to ground, this DTC will set.
	If the ABS module detects that the RR wheel speed sensor circuit is shorted to battery voltage, is open or has high resistance, this

Normal Operation

The voltage required for correct ABS operation is between 10 and 18 volts. Fused battery voltage is supplied to the ABS module from Battery Junction Box (BJB) fuse 12 (30A) along circuit 30-CF13 (RD), BJB fuse 15 (20A) along circuit 30-CF6 (RD). Fused ignition voltage is supplied to the ABS module from Central Junction Box (CJB) fuse 161 (7.5A) along circuit 15-CF6 (GN/YE). Ground is provided along circuit 91-CF6 (BK/YE) and circuit 91-CF13 (BK/BU).

- DTC U3003:16 (Battery Voltage: Circuit Voltage Below Threshold) â If the voltage on circuit 30-CF13 (RD), 30-CF6 (RD) or 15-CF6 (GN/YE) is below 10 volts, this DTC will set.
- DTC U3003:17 (Battery Voltage: Circuit Voltage Above Threshold) â If the voltage on circuit 30-CF13 (RD), 30-CF6 (RD) or 15-CF6 (GN/YE) is above 17 volts, this DTC will set.
- DTC U3003:62 (Battery Voltage: Signal Compare Failure) â The ABS module compares measured input voltage with the battery voltage that is broadcast on the High Speed Controller Area Network (HS-CAN). If the measured voltage at the ABS module does not match the battery voltage reported by other modules on the bus, this DTC will set.

This pinpoint test is intended to diagnose the following:

- Charging system
- Fuses
- Battery
- Wiring, terminals or connectors
- ABS module

PINPOINT TEST I: DTCs U3003:16, 17 AND 62

NOTE: DTCs U3003:16 and 17 can set if the vehicle has been recently jump started, the 12-volt battery has been recently charged or the 12-volt battery has been discharged. The 12-volt battery may become discharged due to excessive load(s) on the charging system from aftermarket accessories or if the battery has been left unattended with the accessories on.

NOTE: Carry out a thorough inspection and verification before proceeding with the pinpoint test. Refer to Inspection and Verification in this section.

NOTE: This vehicle has an in-line test connector C126 which may make circuit testing easier in certain situations.

Refer to Wiring Diagrams Cell 42 for schematic and connector information.

Test Step	Result / Action to Take
I1 RETRIEVE ALL CMDTCs IN ALL MODULES	
• Ignition ON. • Enter the following diagnostic mode on the scan tool: Self Test â All CMDTCs . • **Is DTC U3003:16 or 17, DTCs B1317, B1318 and/or B1676 present in one or more modules AND DTC P0563, P0620, P0625, P0626 or P065B present in the PCM?**	**Yes** REFER to Section 414-00 for diagnosis of the battery and charging system. **No** For DTC U3003:16 or 17, GO to I3 . For DTC U3003:62, GO to I2 .
I2 CHECK THE ABS MODULE DTCs	
	Yes GO to the ABS Module DTC Chart in this

Low/Reverse	5	5	2.2-2.5 (0.0866-0.0984)	â	2.75-2.85 (0.1082-0.1122)
Low/Reverse	5	5	2.2-2.5 (0.0866-0.0984)	â	2.95-3.05 (0.1161-0.1200)

Intermediate/Overdrive Band Bolt Chart

Bolt Length		Ford Part Number	Bolt Head Number
mm	Inch		
39.0 mm	1.535	â	7
38.5 mm	1.515	â	6
38.0 mm	1.496	â	5
37.5 mm	1.476	â	4
37.0 mm	1.456	â	3
36.5 mm	1.437	â	2
36.0 mm	1.417	â	1

Reference: Band/Clutch Application Chart

Gear	Forward Clutch	Direct Clutch	Reverse Clutch	Intermediate/ Overdrive Band	Low Reverse Clutch	Low One-Way Clutch
P	â	â	â	â	â	â
R	â	â	X	â	X	â
N	â	â	â	â	â	â
4th	â	X	â	X	â	â
3rd	X	X	â	â	â	â
2nd	X	â	â	X	â	â
1st	X	â	â	â	â	X
LOW (Manual 1st)	X	â	â	â	X	X

Line Pressure Chart

Range	Idle	Idle	Stall	Stall
P, N	345-450 kPa	50-65 psi	â	â
R	450-585 kPa	65-85 psi	1,930-2,310 kPa	280-335 psi
D, 2, 1	345-450 kPa	50-65 psi	1,240-1,450 kPa	180-210 psi

Diagnostic Strategy

Special Tool(s)

 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

Troubleshooting an electronically controlled automatic transaxle is simplified by using the proven method of diagnosis. One of the most important things to remember is that there is a definite procedure to follow.

NOTE: Do not take any shortcuts or assume that critical checks or adjustments have already been made.

Follow the procedures as written to avoid missing critical components or steps.

To correctly diagnose a concern, have the following publications available:

- Powertrain Control/Emissions Diagnosis (PC/ED) Manual
- TSB Messages
- Wiring Diagrams manual

These publications provide the necessary information when diagnosing transaxle concerns.

Use the Diagnostic Flow Chart as a guide and follow the steps as indicated.

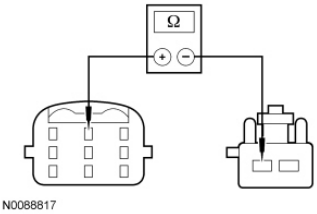
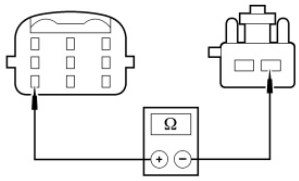
Preliminary Inspection

- Know and understand the customers concern.
- Verify the concern by operating the vehicle.
- Check the transmission fluid levels and condition.
- Check for non-factory add-on items.
- Check selector lever linkages for correct adjustment.
- Check TSB messages regarding the concern.

Diagnostics

- Carry out On-Board Diagnostic (OBD) procedures Key ON Engine OFF (KOEO) and Key ON Engine Running (KOER).
- Record all DTCs.
- Repair all non-transaxle DTCs first.
- Repair all transaxle DTCs second.
- Erase all continuous DTCs and attempt to repeat them.
- Repair all continuous DTCs.
- If only pass DTCs are obtained, proceed to the Diagnosis by Symptom Index. Refer to Diagnosis By Symptom in this section for further information and diagnosis.

	module)				
P0770:00	SSE circuit failure (includes SSE , harness wiring, connectors and control module)	Electrical failure in SSE or wiring system related to SSE	SSE circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during OBD .	Not all gears present. MIL ON.	
P0771:00	Functional failure regarding SSE or main control system failure (shift valves, orifices and sealing)	SSE functional failure (stuck OFF) or main control system failure (shift valves, orifices and sealing)	Mechanical or hydraulic failure of the shift solenoid or main control valves which work with the solenoid.	Not all gears present.	
P0772:00	Functional failure regarding SSE or main control system failure (shift valves, orifices and sealing)	SSE functional failure (stuck ON) or main control system failure (shift valves, orifices and sealing)	Mechanical or hydraulic failure of the shift solenoid or main control valves which work with the solenoid.	Not all gears present.	
P0773:00	SSE circuit failure (includes SSE , harness wiring, connectors and control module)	Electrical failure in SSE or wiring system related to SSE	SSE circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during OBD .	Not all gears present. MIL OFF.	
P0960:00	Line Pressure Control (LPC) circuit failure (includes LPC solenoid, harness wiring, connectors and control module)	LPC solenoid circuit open	Voltage through LPC solenoid is checked. Error is noted if tolerance is exceeded.	Open circuit causes maximum LPC pressure, harsh engagements and shifts.	
P0962:00	LPC circuit failure (includes LPC solenoid, harness wiring, connectors and control	LPC solenoid circuit failure, shorted circuit to ground	Voltage through LPC solenoid is checked. An error will be noted if tolerance is exceeded.	Short circuit causes maximum LPC pressure, harsh engagement and shifts.	

• Measure the resistance between transaxle vehicle harness connector pin 2 (component side, transaxle internal harness) and transaxle internal harness connector pin 2.  N0088817 • Measure the resistance between transaxle vehicle harness connector pin 7 (component side, transaxle internal harness) and transaxle internal harness connector pin 7.  N0088825 • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new LPC solenoid. TEST the system for normal operation. **No** INSTALL a new transaxle internal harness. TEST the system for normal operation.

PINPOINT TEST E: TSS SENSOR AND OSS SENSOR

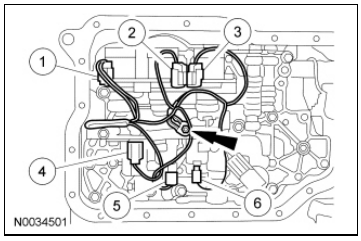
NOTE: Refer to the Turbine Shaft Speed (TSS) Sensor Vehicle Harness Connector and Output Shaft Speed (OSS) Sensor Vehicle Harness Connector illustrations within the Transaxle Connector Layouts procedure in this section.

Test Step	Result / Action to Take
E1 ELECTRONIC DIAGNOSTICS SET UP	
• Make sure the transaxle harness connector is fully seated, terminals are fully engaged in the connector and in good condition before proceeding. • Connect the scan tool. • Ignition ON. • Access the following PIDs: TSS or OSS. • **Is communication with the PCM established?**	**Yes** GO to E2 . **No** REPEAT procedure to access the speed sensor PIDs. If the scan tool cannot establish communication with the PCM, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis of PCM.
E2 DRIVE CYCLE TEST	
• While monitoring the appropriate speed sensor PID, drive the vehicle so that the transaxle upshifts and downshifts	**Yes** GO to E3 .

• PCM, vehicle wiring harness, Shift Solenoid C (SSC) and Pressure Control Solenoid A (PCA)	• Carry out On-Board Diagnostic (OBD) tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM.
	• GO to Pinpoint Test A .
	• Repair as required. Clear the DTCs, road test and rerun OBD test.
306 - HYDRAULIC/MECHANICAL ROUTINE	
Incorrect Pressures	
• High/low pressures	• Carry out Line Pressure Test. Refer to Special Testing Procedures in this section.
Main Control	
• Bolts not tightened to specification	• Tighten to specifications.
• Separator plate damaged	• Inspect for damage. If damaged, repair as necessary.
• Contamination	• Disassemble and clean.
• Valves/springs damaged, misassembled, missing, stuck or bore damaged	• If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transaxle damage.
Forward Clutch Assembly	
• Seals, piston damaged	• Inspect for damage. Repair as necessary.
• Friction elements damaged or worn	• Inspect for damage. Repair as necessary.
• Return springs damaged	• Inspect for damage. Repair as necessary.

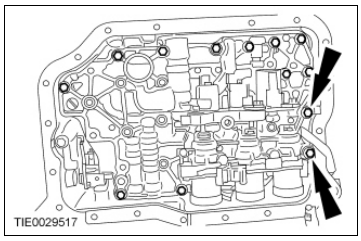
Engagement Concerns: No Forward and No Reverse

Possible Component	Reference/Action
207 - ELECTRICAL ROUTINE	
Powertrain Control System	
• PCM and vehicle wiring harnesses (nolectrical activity equals 3rd gear	• Carry out On-Board Diagnostic (OBD) tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM.



5. **NOTE:** Note the locations of the 2 long bolts.

   Remove the main control valve body and accumulators.

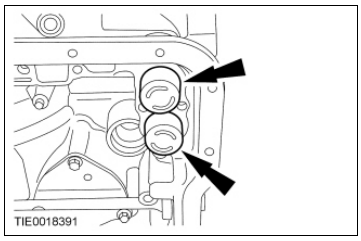


6. **NOTE:** Each accumulator is equipped with 2 springs. All 4 springs are different sizes.

   NOTE: Note the size and location of the accumulator springs to aid assembly.

   NOTE: Note the shape of each piston and the piston bore from which the piston was removed. The shape and size will vary depending on application. The piston must be installed in its correct bore during assembly.

   Remove the accumulator pistons and springs.



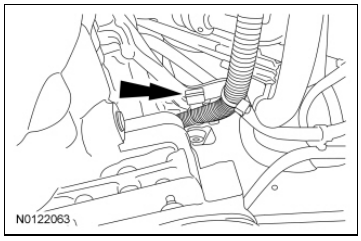
Installation

1. **NOTE:** The thin longer springs are for the neutral and drive accumulator.

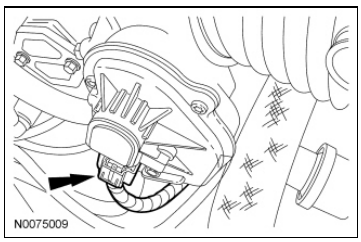
   NOTE: Accumulator bore and pistons are matched by depth; some pistons may have steps. Install the pistons in the same bore as removed.

   Install the accumulator pistons and springs.

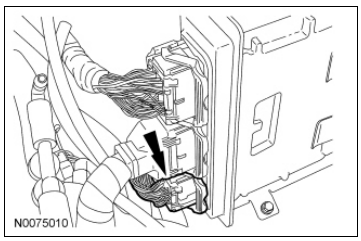
   1. Accumulator 1 and 2.
   2. Accumulator N and D.



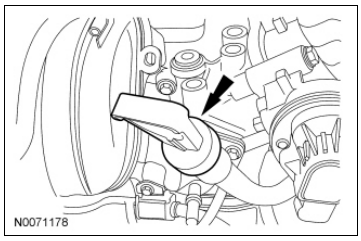
11. Disconnect the throttle control electrical connector.



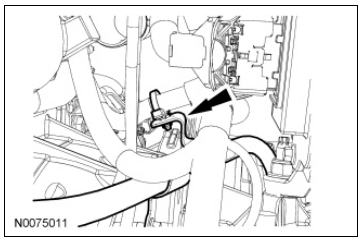
12. Disconnect the bottom PCM electrical connector.



13. Remove the transmission fluid level indicator.



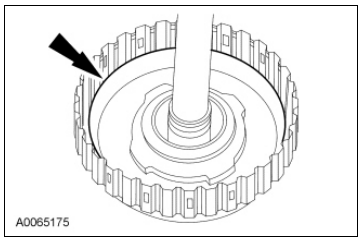
14. Remove the power steering hose retainers and the wiring harness retainer from the transaxle filler tube.



15. Remove the transaxle filler tube bolt, rotate the transaxle filler tube from under the Throttle Body (TB) and remove the transaxle filler tube.

6. ***NOTICE:*** **If damage is found to the forward clutch piston seals, install a new forward clutch piston.**

   Remove the forward clutch piston assembly.

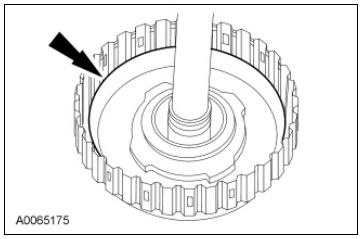


Assembly

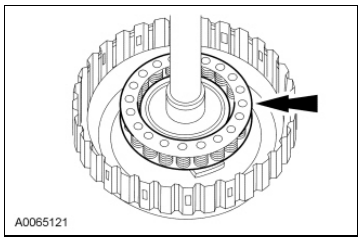
1. Soak the internal spline clutch plates in clean transmission fluid.

2. Inspect the forward clutch piston bore surfaces for nicks or scratches. Install a new balance piston if necessary.

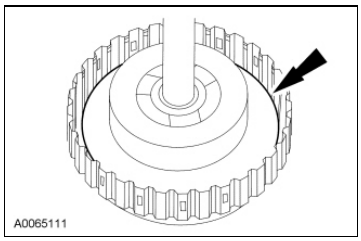
3. Lubricate and install the forward clutch piston assembly.



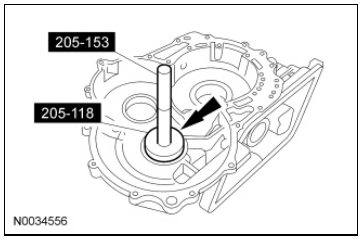
4. Install the forward piston return spring.



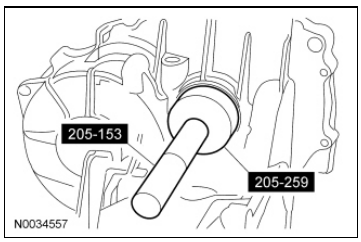
5. Lubricate and install the forward clutch balance piston.



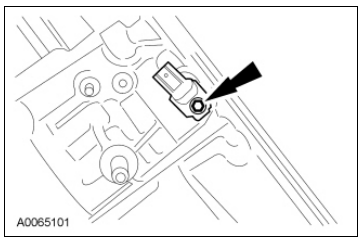
6. Using the Spring Washer Compressor, install the forward clutch assembly in a suitable press.



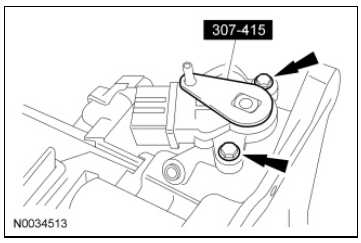
7. Using the Axle Oil Seal Installer and Handle, install the halfshaft seals (LH shown).



- Tighten to 10 Nm (89 lb-in).



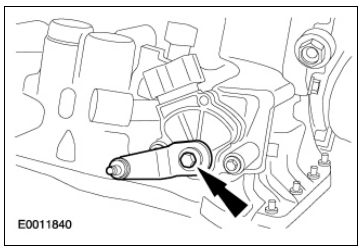
90. Using the Transmission Range Sensor Alignment Tool, align the TR sensor and tighten the bolts.
    - Tighten to 10 Nm (89 lb-in).



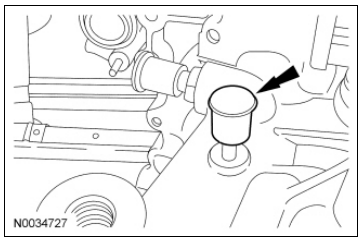
91. ***NOTICE:*** **Do not use air tools on this bolt. Hold the manual control lever while tightening the manual control lever bolt. Damage to the manual control lever shaft will occur.**

    Install the manual control lever bolt.

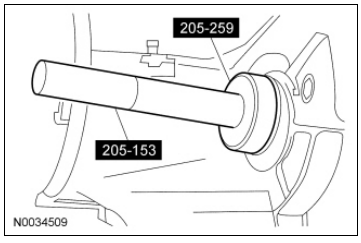
    - Tighten to 30 Nm (22 lb-ft).



92. Install the vent cap past the second detent notch. Be sure the vent moves up and down freely.

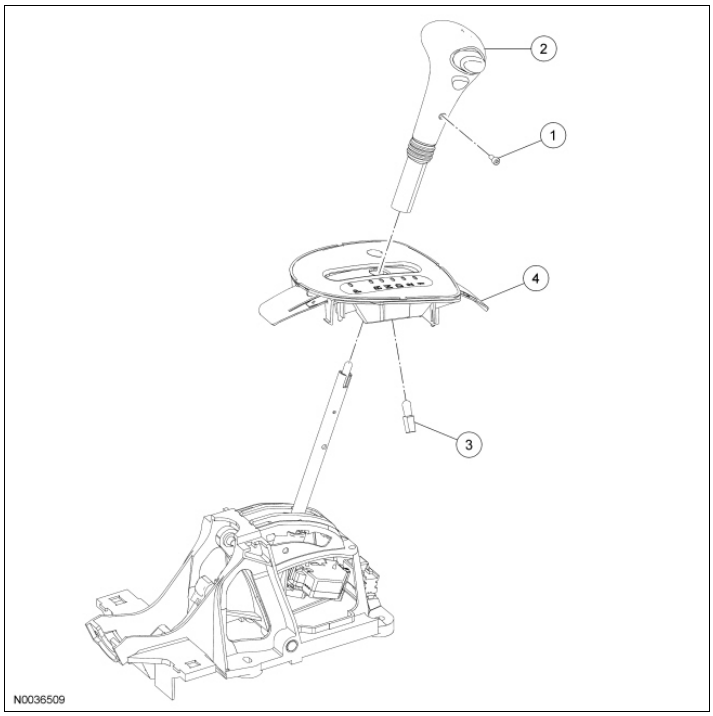


93. Using the Axle Oil Seal Installer and Handle, install the LH halfshaft seal.



94. Using the Output Shaft Seal Installer and Handle, install the RH halfshaft seal.

Selector Lever Bezel



Item	Part Number	Description
1	7348	Selector lever knob screw
2	7213	Selector lever knob
3	-	Selector lever light
4	7A213	Selector lever bezel

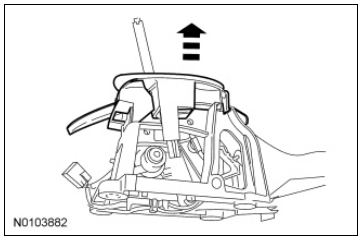
Removal

1. Remove the selector lever knob. For additional information, refer to Selector Lever Knob in this section.

2. **NOTE:** Selector lever assembly removed for clarity.

   Remove the selector lever bezel.

   - Unclip the bezel.
   - Unclip the lamp.



Installation

DTC Chart

Evaporative Emission System DTC Chart

DTC	Description	Action
P0446	Evaporative Emission System Vent Control Circuit	GO to Pinpoint Test A .
P0451	Evaporative Emission System Pressure Sensor/Switch Range/Performance	GO to Pinpoint Test A .
P0452	Evaporative Emission System Pressure Sensor/Switch Low	GO to Pinpoint Test A .
P0453	Evaporative Emission System Pressure Sensor/Switch High	GO to Pinpoint Test A .
P0454	Evaporative Emission System Pressure Sensor/Switch Intermittent	GO to Pinpoint Test A .
P1450	Unable to Bleed up Fuel Tank Vacuum	GO to Pinpoint Test A .
P1451	Evaporative Emission System Vent Control Circuit	GO to Pinpoint Test A .
P260F	Emission System Monitoring Processor Performance	GO to Pinpoint Test A .

Symptom Chart

Symptom Chart

Pinpoint Test

Pinpoint Test A: Slow to Fill

Normal Operation

Under normal operation, fuel should flow at a steady rate through the fuel tank filler pipe into the fuel tank. As fuel enters the fuel tank, air is vented through the filler pipe or the On-Board Refueling Vapor Recovery (ORVR) system.

This pinpoint test is intended to diagnose the following:

- Fuel tank filler pipe fresh air hose or recirculation tube, if equipped
- Fuel tank filler pipe
- Evaporative Emission (EVAP) system
- Fuel tank inlet check valve (part of the fuel tank)
- Fuel level vent valve (part of the fuel tank)

PINPOINT TEST A: SLOW TO FILL

Test Step	Result / Action to Take
A1 CARRY OUT INSPECTION AND VERIFICATION	
• Carry out Inspection and Verification. • **Was the cause of the concern found?**	**Yes** REPAIR or INSTALL new components to correct the concern.

Fuel Tank Filler Pipe

Special Tool(s)

 ST1134A	Fuel Storage Tanker 164-R3202 or equivalent

Removal and Installation

⚠ 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.

⚠ WARNING: Do not carry personal electronic devices such as cell phones, pagers or audio equipment 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.

⚠ WARNING: Remove the fuel filler cap slowly. The fuel system may be under pressure. If the fuel filler cap is venting vapor or if you hear a hissing sound, wait until it stops before completely removing the fuel filler cap. Otherwise, fuel may spray out. Failure to follow these instructions may result in serious personal injury.

⚠ WARNING: When handling fuel, always observe fuel handling precautions and be prepared in the event of fuel spillage. Spilled fuel may be ignited by hot vehicle components or other ignition sources. Failure to follow these instructions may result in serious personal injury.

⚠ WARNING: Always disconnect the battery ground cable at the battery when working on an evaporative emission (EVAP) system or 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. For additional information, refer to Section 100-02 .
2. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
3. Carefully turn the fuel tank filler cap counterclockwise approximately one-fourth turn until the thread disengages and position aside.
4. Insert a length of semi-rigid fuel drain tube into the fuel tank filler pipe as far as possible.
5. Attach the Fuel Storage Tanker to the fuel drain tube and remove any residual fuel in the fuel tank filler pipe.
6. Remove the RR wheel and tire. For additional information, refer to Section 204-04 .
7. Remove the retainers and the RR splash shield.

Power Steering

Refer to Section 211-00 .

Torque Specifications

Description	Nm	lb-ft	lb-in
Steering column bolt	17	-	150
Steering column nuts	16	-	142
Steering column opening reinforcement bolts	11	-	97
Steering column shaft-to-steering column bolt	28	21	-
Steering wheel bolt	45	33	-

RH multifunction switch only

5. Disconnect the RH multifunction switch electrical connector.

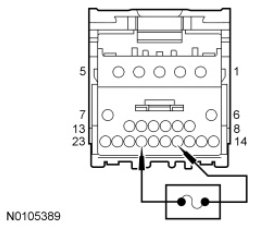
6. Remove the 2 RH multifuncwitch screws and the multifunction switch.

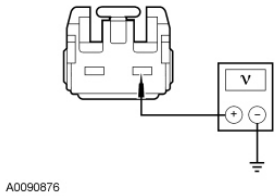
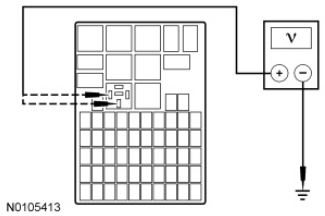
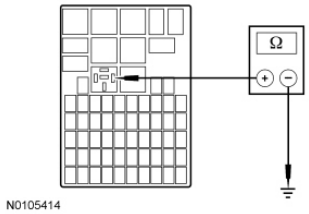
All vehicles

7. To install, reverse the removal procedure.

- Air inlet mode switch
- GEM
- IC
- Stuck or bound linkage or door

PINPOINT TEST D: THE AIR INLET DOOR IS INOPERATIVE

Test Step	Result / Action to Take
D1 CHECK RECIRC INDICATOR	
♦ Ignition ON. ♦ Select PANEL mode on the function selector switch. ♦ Select the highest speed setting on the blower motor switch. ♦ Press the RECIRC button. ♦ **Does the indicator on the RECIRC button illuminate?**	**Yes** GO to D9 . **No** GO to D2 .
D2 CHECK THE RECIRC_SW IC PID	
♦ Enter the following diagnostic mode on the scan tool: RECIRC_SW Instrument Cluster (IC) PID . ♦ Press the RECIRC button. ♦ **Does the RECIRC_SW IC PID read YES?**	**Yes** GO to D3 . **No** GO to D6 .
D3 CHECK THE RECIRC INDICATOR	
♦ Ignition OFF. ♦ Disconnect: GEM C201C . ♦ Ignition ON. ♦ Connect a fused jumper between GEM C201C-17, circuit 15-FA28 (GN/YE), harness side and GEM C201C-20, circuit 29-DK20 (OG/GN), harness side.  ♦ **Does the indicator on the RECIRC button illuminate?**	**Yes** GO to D14 . **No** GO to D4 .
D4 CHECK THE RECIRC INDICATOR SWITCHED GROUND CIRCUIT FOR AN OPEN	
♦ Ignition OFF. ♦ Disconnect: Air Inlet Mode Switch C2890 . ♦ Measure the resistance between GEM C201C-17, circuit 15-FA28 (GN/YE), harness side and air inlet mode switch C2890-1, circuit 15-FA28 (GN/YE), harness side.	**Yes** GO to D5 . **No** REPAIR circuit 15-FA28 (GN/YE) for an open. TEST the system for normal operation.

 A0090876 ♦ **Is the voltage greater than 10 volts?**	
K4 CHECK THE VOLTAGE TO THE BLOWER MOTOR RELAY	
♦ Ignition OFF. ♦ Disconnect: Blower Motor Relay . ♦ Ignition ON. ♦ Measure the voltage between ground and: ♦ blower motor relay pin 85, circuit 15-DA1J (GN/YE). ♦ blower motor relay pin 30, circuit 15-FA18 (GN/OG).  N0105413 ♦ **Are the voltages greater than 10 volts?**	**Yes** GO to K5 **No** VERIFY Battery Junction Box (BJB) fuse 13 (30A) is OK. If OK, REPAIR circuit 15-DA1J (GN/YE) or 15-FA18 (GN/OG) for an open. TEST the system for normal operation. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.
K5 CHECK THE GROUND TO THE BLOWER MOTOR RELAY	
♦ Ignition OFF. ♦ Measure the resistance between ground and blower motor relay pin 86, circuit 91-DA6 (BK/WH).  N0105414 ♦ **Is the resistance less than 5 ohms?**	**Yes** REPAIR circuit 15-FA18 (GN/OG) for an open. TEST the system for normal operation. **No** REPAIR circuit 91-DA6 (BK/WH) for an open. TEST the system for normal operation.

Pinpoint Test L: The Blower Motor Does Not Operate Correctly

2. Connect a R-134a Refrigerant Management Machine to the low- and high-pressure service gauge port valves following the operating instructions provided by the equipment manufacturer.

3. Recover the refrigerant from the system following the operating instructions provided by the equipment manufacturer. Note the amount of oil removed during the refrigerant recovery (if any). Add that same amount back into the system once repairs are complete.

4. Once the R-134a Refrigerant Management Machine has recovered the refrigerant, switch OFF the power supply.

5. Allow the system to set for about 2 minutes, and observe the system vacuum reading. If the vacuum is not lost, disconnect the recovery equipment.

6. If the system does lose vacuum, repeat Steps 3 through 5 until the vacuum level remains stable for 2 minutes.

7. Carry out the required repairs.

Refrigerant System Evacuation Using a R-134a Refrigerant Management Machine

1. Connect a R-134a Refrigerant Management Machine to the low- and high-pressure service gauge port valves following the operating instructions provided by the equipment manufacturer.

2. Evacuate the system until the low-pressure gauge reads at least 99.4 kPa (29.5 in-Hg) of vacuum and as close to 101.1 kPa (30 in-Hg) as possible. Continue to operate the Vacuum Pump for a minimum of 45 minutes.

3. Turn OFF the Vacuum Pump. Observe the low-pressure gauge for 5 minutes to make sure that the system vacuum is held.

Refrigerant System Evacuation Using a R-134a Manifold Gauge Set and Vacuum Pump

NOTE: Leaks in refrigerant system service equipment, hoses or gauges can cause a leak in vacuum that may be misinterpreted as a problem with the vehicle's refrigerant system. It is necessary to leak-test all refrigerant system service equipment, hoses and gauges on a weekly basis to verify that no leaks are present.

1. Connect the R-134a Manifold Gauge Set to the low-side and high-side service gauge port valves.

2. Connect the center (yellow) hose from the R-134a Manifold Gauge Set to the suction port on the Vacuum Pump.

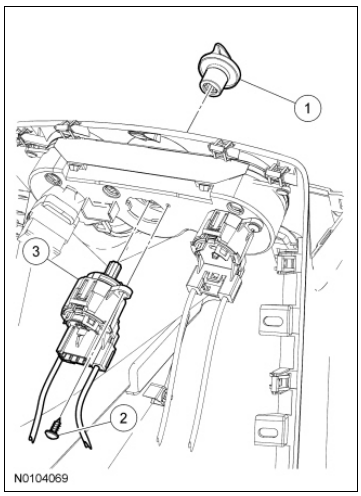
3. Open all valves on the R-134a Manifold Gauge Set and both service gauge port valves.

4. Turn on the Vacuum Pump and evacuate the system until the low-pressure gauge reads at least 99.4 kPa (29.5 in-Hg) of vacuum and as close to 101.1 kPa (30 in-Hg) as possible. Continue to operate the Vacuum Pump for a minimum of 45 minutes.

5. Close the high-side and low-side valves on the R-134a Manifold Gauge Set (not the service gauge port valves) and turn OFF the Vacuum Pump.

6. Observe the low-pressure gauge for 5 minutes to make sure that the system vacuum is held. If vacuum is not held for 5 minutes, leak test the system, repair the leak and evacuate the system again.

Function Selector Switch



Item	Part Number	Description
1	18519	Function selector switch knob
2	W700580	Function selector switch screw
3	19B888	Function selector switch and cable assembly

Removal and Installation

NOTE: The function selector switch is supplied as an assembly with the function selector cable assembly.

1. Remove the floor console. For additional information, refer to Section 501-12 .
2. Remove the function selector switch knob.
3. Remove the function selector switch screw.
4. Rotate the function selector switch to disengage it from the climate control assembly and remove the function selector switch and cable assembly.
5. To install, reverse the removal procedure.

Refer to Wiring Diagrams Cell 71 , Cluster and Panel Illumination for schematic and connector information.

Normal Operation

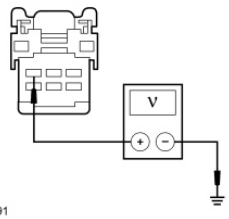
A variable Pulse Width Modulated (PWM) voltage is supplied to the air inlet mode switch from the instrument panel dimmer switch (part of the headlamp switch) when the side, main or parking lamps are on.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Air inlet mode switch

PINPOINT TEST I: THE AIR INLET MODE SWITCH ILLUMINATION IS INOPERATIVE

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

Test Step	Result / Action to Take
I1 CHECK THE AIR INLET MODE SWITCH ILLUMINATION VOLTAGE CIRCUIT FOR AN OPEN	
• Ignition OFF. • Disconnect: Air Inlet Mode Switch C2890. • With the parking lamps on, rotate the instrument panel dimmer switch to the full illumination position. • Measure the voltage between the air inlet mode switch C2890-3, circuit 29S-LH53 (OG/BK), harness side and ground.  N0104891 • **Is the voltage greater than 10 volts?**	**Yes** INSTALL a new air inlet mode switch. TEST the system for normal operation. **No** REPAIR circuit 29S-LH53 (OG/BK) for an open. TEST the system for normal operation.

Pinpoint Test J: The A/C Switch Illumination Is Inoperative

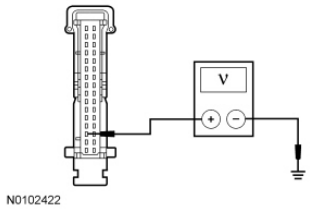
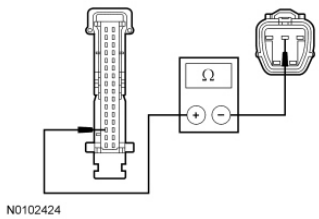
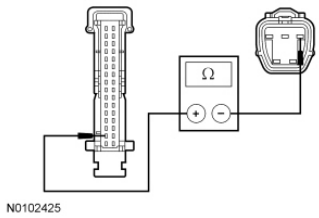
Refer to Wiring Diagrams Cell 71 , Cluster and Panel Illumination for schematic and connector information.

Normal Operation

A variable Pulse Width Modulated (PWM) voltage is supplied to the A/C switch from the instrument panel dimmer switch (part of the headlamp switch) when the side, main or parking lamps are on.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors

♦ Ignition OFF. ♦ Disconnect: IC C220b. ♦ Ignition ON. ♦ Measure the voltage between the IC C220b-14, circuit 9-GA7 (BN/RD), harness side and ground.  N0102422 ♦ **Is any voltage present?**	**Yes** REPAIR circuit 9-GA7 (BN/RD) for a short to voltage. CLEAR the DTCs. REPEAT the self-test. **No** GO to B5 .
B5 CHECK THE FUEL LEVEL SIGNAL CIRCUIT FOR AN OPEN	
♦ Ignition OFF. ♦ Measure the resistance between the IC C220b-14, circuit 9-GA7 (BN/RD), harness side and the fuel pump module assembly C433-2, circuit 9-GA7 (BN/RD), harness side.  N0102424 ♦ **Is the resistance less than 5 ohms?**	**Yes** GO to B6 . **No** REPAIR circuit 9-GA7 (BN/RD) for an open. CLEAR the DTCs. REPEAT the self-test.
B6 CHECK THE FUEL LEVEL RETURN CIRCUIT FOR AN OPEN	
♦ Measure the resistance between the IC C220b-15, circuit 8-GA7 (WH/RD), harness side and the fuel pump module assembly C433-1, circuit 8-GA7 (WH/RD), harness side.  N0102425 ♦ **Is the resistance less than 5 ohms?**	**Yes** GO to B13 . **No** REPAIR circuit 9-GA7 (BN/RD) for an open. CLEAR the DTCs. REPEAT the self-test.
B7 CHECK THE FUEL PUMP MODULE FOR A SHORT TO GROUND	
♦ Disconnect: Fuel Pump Module C433. ♦ Ignition ON. ♦ Wait one minute.	**Yes** GO to B12 .

- IC

PINPOINT TEST R: THE POWERTRAIN MALFUNCTION (WRENCH) WARNING INDICATOR IS NEVER/ALWAYS ON

Test Step	Result / Action to Take
R1 CARRY OUT THE IC INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL	
♦ Ignition ON. ♦ Enter the following diagnostic mode on the scan tool: IC DataLogger. ♦ Select the IC powertrain malfunction (wrench) warning indicator (ETC_IND) active command. Command the powertrain malfunction (wrench) warning indicator on and off. Observe the powertrain malfunction (wrench) warning indicator. ♦ **Does the powertrain malfunction (wrench) warning indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to R2 . **No** INSTALL a new IC . REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
R2 RETRIEVE THE RECORDED DTCs FROM THE IC SELF-TEST	
♦ Check for recorded IC DTCs from the self-test. ♦ **Are any DTCs recorded?**	**Yes** For DTC U0100, GO to Pinpoint Test AJ . For all other DTCs, REFER to DTC Charts in this section. **No** GO to R3 .
R3 RETRIEVE THE RECORDED DTCs FROM THE KOEO PCM SELF-TEST	
♦ Check for recorded PCM DTCs from the Key ON Engine OFF (KOEO) self-test. ♦ **Are any DTCs recorded?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** If the powertrain malfunction (wrench) warning indicator is always on, INSTALL a new PCM. REFER to Section 303-14 . TEST the system for normal operation. If the powertrain malfunction (wrench) warning indicator is never on, the system is functioning correctly.

Pinpoint Test S: The Overdrive (O/D) Off Indicator Is Never/Always On

than 5 seconds.

This pinpoint test is intended to diagnose the following:

- TPMS
- Instrument Cluster (IC)

PINPOINT TEST AM: DTC U0127

Test Step	Result / Action to Take
AM1 VERIFY THE CUSTOMER CONCERN	
♦ Ignition ON. ♦ Verify that there is an observable symptom present. ♦ **Is an observable symptom present?**	**Yes** GO to AM2 . **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.
AM2 CHECK THE COMMUNICATION NETWORK	
♦ Ignition ON. ♦ Enter the following diagnostic mode on the scan tool: Network Test. ♦ Carry out the network test. ♦ **Does the TPMS module pass the network test?**	**Yes** GO to AM3 . **No** REFER to Section 418-00 .
AM3 RETRIEVE THE RECORDED DTCs FROM THE IC SELF-TEST	
♦ Check for recorded IC DTCs from the self-test. ♦ **Is DTC B1317 or DTC B1318 recorded?**	**Yes** GO to Pinpoint Test AG (B1317) or GO to Pinpoint Test AH (B1318). **No** GO to AM4 .
AM4 RECHECK THE IC DTCs	
♦ Clear the DTCs. Repeat the IC self-test. ♦ **Is DTC U0127 still present?**	**Yes** INSTALL a new TPMS module. REFER to Section 204-04 . CLEAR the DTCs. REPEAT the IC self-test. If DTC U0127 is still present, INSTALL a new IC . REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The DTC may have been set due to high network traffic.

• C1703 - Right Rear Sensor Circuit Failure or Blockage	shorted to ground.
• C1706 - Left Rear Center Sensor Circuit Failure	A continuous and on-demand DTC that sets when the PAM senses when any of the left rear inner parking aid sensor circuits are open or the sensor signal line is shorted to ground.
• C1709 - Right Rear Center Sensor Circuit Failure	A continuous and on-demand DTC that sets when the PAM senses when any of the right rear inner parking aid sensor circuits are open or the sensor signal line is shorted to ground.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Parking aid sensor(s) >PAM

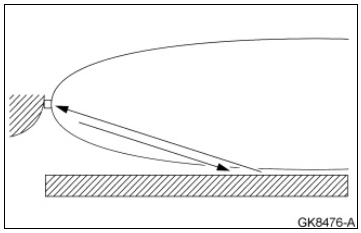
PINPOINT TEST B: DTCs C1700, C1703, C1706 AND C1709

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

Test Step	Result / Action to Take
B1 CHECK THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PAM SELF-TESTS	
• Check the recorded PAM DTCs from the continuous and on-demand self-tests. • **Are multiple DTCs recorded?**	**Yes** GO to B2 . **No** For DTC C1700, C1703, C1706 or C1709, GO to B3 . For all others, REFER to DTC Charts in this section.
B2 CHECK THE BUMPER WIRING HARNESS	
• Inspect the bumper wiring harness for opens, shorts, grounds, or corrosion. • **Is the bumper wiring harness OK?**	**Yes** GO to B3 . **No** REPAIR or INSTALL a new bumper wiring harness. CLEAR the DTCs. TEST the system for normal operation.
B3 CHECK THE SENSOR CIRCUITRY FOR OPENS	

Elevation System Check

1. Check the parking aid system to make sure that the system **does not** detect signals caused by ground reflections.



2. The following system check should be carried out with the vehicle on a 4.6 m (15 ft) wide by 3.0 m (10 ft) deep smooth concrete surface, free of all obstacles. The area should also be free of noise from fans and pneumatic tools.

3. Turn the ignition to the ON position, engine off.

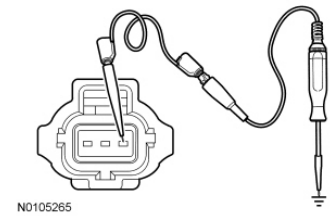
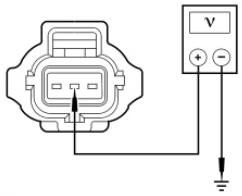
4. Set the parking brake on.

5. Place the gearshift in REVERSE (R).

6. **NOTE:** No audible warning tones should be heard. If audible warning tones are heard, check to make sure the bumper is installed correctly and not tilted downward so that the sensor is pointing toward the ground.

   Verify that **no** audible warning tones are heard.

   - If an audible warning tone is heard, refer to Parking Aid in the Diagnosis and Testing portion of this section.

 N0105265 • **Does the test lamp illuminate?**	
C5 CHECK THE GENERATOR COMMAND LINE FAULT (GENCMD_LF) PID	
• Connect: Generator C102A. • Start the engine. • **NOTE:** Many of the PCM PIDs selected will be monitored later in this pinpoint test. • Select and monitor the following PCM PIDs: ♦ Generator Monitor (GENMON) ♦ Generator Command (GENCMD) ♦ Generator Command Line Fault (GENCMD_LF) • With the engine running at idle, monitor the GENCMD_LF PID. • **Is the GENMON_LF PID ON?**	**Yes** GO to C6 . **No** GO to C9 .
C6 CHECK THE GENCOM CIRCUIT FOR A SHORT TO POWER	
• Ignition OFF. • Disconnect: Generator C102A. • Ignition ON. • Measure the voltage between generator C102A-2, circuit CDC10 (BU/OG), harness side and ground.  N0087307 • **Does voltage read 1 volt or less?**	**Yes** GO to C7 . **No** GO to C11 .
C7 COMPARE THE PCM PIDs GENERATOR MONITOR (GENMON) AND GENERATOR COMMAND (GENCMD)	
• Ignition OFF. • Connect a fused jumper wire between generator C102A-1, circuit CDC15 (VT), harness side and generator C102A-2, circuit CDC10 (BU/OG), harness side.	**Yes** GO to C8 . **No** GO to C12 .

Battery Disconnect

⚠ WARNING: Batteries contain sulfuric acid and produce explosive gases. Work in a well-ventilated area. Do not allow the battery to come in contact with flames, sparks or burning substances. Avoid contact with skin, eyes or clothing. Shield eyes when working near the battery to protect against possible splashing of acid solution. In case of acid contact with skin or eyes, flush immediately with water for a minimum of 15 minutes, then get prompt medical attention. If acid is swallowed, call a physician immediately. Failure to follow these instructions may result in serious personal injury.

⚠ WARNING: Always deplete the backup power supply before repairing or installing any new front or side air bag supplemental restraint system (SRS) component and before servicing, removing, installing, adjusting or striking components near the front or side impact sensors or the restraints control module (RCM). Nearby components include doors, instrument panel, console, door latches, strikers, seats and hood latches. Refer to the Description and Operation portion of Section 501-20B for location of the RCM and impact sensor(s). To deplete the backup power supply energy, disconnect the battery ground cable and wait at least 1 minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result in serious personal injury or death in the event of an accidental deployment.

⚠ WARNING: Always lift a plastic-cased battery with a battery carrier or with hands on opposite corners. Excessive pressure on the battery end walls may cause acid to flow through the vent caps, resulting in personal injury and/or damage to the vehicle or battery.

⚠ WARNING: Battery posts, terminals and related accessories contain lead and lead components. Wash hands after handling. Failure to follow these instructions may result in serious personal injury.

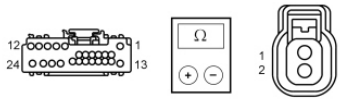
NOTE: When the battery (or PCM) is disconnected and connected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The charging system set point may also vary. The vehicle may need to be driven to relearn its strategy.

1. Disconnect the battery ground terminal.
   - To connect, tighten to 5 Nm (44 lb-in).
2. Open the positive battery terminal access panel.
3. **NOTE:** When disconnecting the battery ground cable to interrupt power to the vehicle electrical system, disconnect the battery ground cable only. It is not necessary to disconnect the positive battery cable.

   Disconnect the positive battery terminal.

   - To connect, tighten to 5 Nm (44 lb-in).
4. To connect, reverse the disconnect procedure.

	C290A-11 8-MD17 (WH/RD)	C612-1 8-MD28 (WH), then ground
	C290A-12 10-MD17 (GY/RD)	C612-2 10-MD28 (GY), then ground
LR (if equipped)	C290A-9 8-MD11 (WH/VT)	C702-1 8-MD11 (WH/VT), then ground
	C290A-22 10-MD11 (GY/WH)	C702-2 10-MD11 (GY/WH), then ground
RR (if equipped)	C290A-10 8-MD18 (WH)	C802-1 8-MD18 (WH)
	C290A-23 10-MD18 (GY)	C802-2 10-MD18 (GY)



N0139824

- **Are the resistances less than 3 ohms between the ACM and the suspect speaker, and greater than 10,000 ohms between the ACM and ground?**

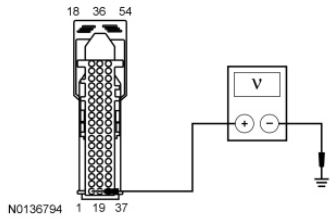
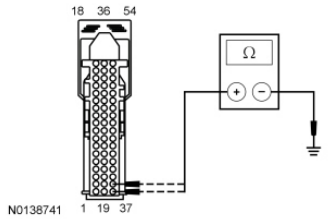
B4 CHECK THE SPEAKER CIRCUITS FOR A SHORT TOGETHER

- Measure the resistance between the suspect speaker, harness side.

Suspect Speaker	Positive Meter Lead	Negative Meter Lead
LF	C523-1 8-MD28 (WH)	C523-2 10-MD28 (GY)
RF	C612-1 8-MD28 (WH)	C612-2 10-MD28 (GY)

Yes
GO to B5 .

No
REPAIR the circuit in question. TEST the system for normal operation.

• **Is DTC P0620, P0625, or P065B set in the PCM?**	**No** GO to L3 .
L3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE	
• Check the battery condition and verify that the battery is fully charged. Refer to Section 414-01 . • **Is the battery OK and fully charged?**	**Yes** GO to L4 . **No** REFER to Section 414-01 .
L4 CHECK THE APIM VOLTAGE SUPPLY	
• Ignition OFF. • Measure and record the voltage at the battery. • Disconnect: APIM C2383. • Ignition ON. • Measure the voltage between the APIM C2383-1, circuit 29-MC12 (OG/YE), harness side and ground.  • **Is the voltage within 0.2 volt of the recorded battery voltage?**	**Yes** GO to L5 . **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
L5 CHECK THE APIM GROUND CIRCUITS FOR CONTINUITY	
• Ignition OFF. • Disconnect: Negative Battery Cable. • Measure the resistance between the APIM C2383-37, circuit 91-MC12 (BK/YE), harness side and ground; and between the APIM C2383-38, circuit 91-MC12 (BK/YE), harness side and ground.  • **Are the resistances less than 3 ohms?**	**Yes** GO to L6 . **No** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.
L6 CHECK FOR CORRECT APIM OPERATION	
• Disconnect the APIM connector. • Check for:	**Yes** INSTALL a new APIM . REFER to Accessory Protocol

Audio Control Module (ACM) Self-Diagnostic Mode

Late Build Audio Systems

NOTE: If the Audio Front Control Module (ACM) is inoperable, the ACM part number may be obtained from a label affixed to the chassis.

1. Turn the ACM on.

2. Operate the audio system in radio tuner (AM/FM) mode.

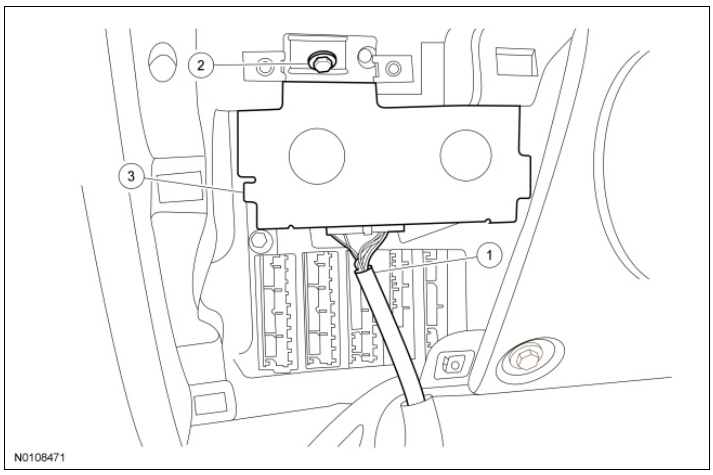
3. Press and hold preset buttons 3 and 6 for 3 seconds until the speaker walk test begins.
   - The display indicates each speaker as it is tested.

4. **NOTE:** If the speaker walk test is the only test required, this procedure can be stopped after Step 3 by turning the ACM off.

   Before the speaker walk test is complete, carry out any of the following actions:

Preset Button Press	Diagnostic Function	Display	Diagnostic Function Description
1	ACM Self-Test	SELF TEST	The ACM carries out a self-test. At the end of the self-test, the display either indicates SELF PASS or SELF FAIL. If the self-test failed, DTCs can be accessed by pressing the TUNE UP button.
2	View DTCs	NO DTCS, or scrolls through DTCs	The ACM displays any DTCs that are present. To scroll through the DTCs, press the TUNE UP button. If no DTCs are present, the display reads NO DTCS. To clear DTC's, press the EJECT button then the TUNE UP button.
3	AM/FM Antenna Signal Strength	SIGNAL ###	The ACM displays the AM/FM antenna signal strength. To run this test, the audio system should be in AM radio tuner mode before entering the ACM self-diagnostic mode. If no antenna is present, a signal strength of 0 will be displayed.
4	Software Levels	SOFT LEVELS	The ACM displays software levels for various components of the audio system. Knowing the software levels may aid diagnostics. Press the TUNE UP button to scroll through the software levels.
5	Display Test	DISPLAY TEST, then all segments illuminate	All of the ACM display segments illuminate.
6	Retrieve ACM Part Number	RADIO CONFIG	The ACM displays the ACM part number and various configuration levels. Press the TUNE UP button to scroll to the desired function.

Telematics Module



Item	Part Number	Description
1	13FW700	Telematics module electrical connector
2	W704875-S	Telematics module screws (2 required)
3	19FW402/ 19FW400	Telematics module (with bracket/without bracket)

Removal

1. Turn the ignition to OFF.

2. Remove the instrument panel fuse box cover.

3. Disconnect the telematics module electrical connector.

4. Remove the telematics module.
    1. Remove the 2 screws.
    2. Remove the bracket.
    3. Remove the telematics module.

Installation

1. Position the telematics module and the bracket, and install the 2 screws.

2. Connect the telematics module electrical connector.

3. Install the instrument panel fuse box cover.

4. Initialize the telematics module.
    1. Wait 5 minutes after the modem-antenna is installed.
    2. Turn the ignition to RUN.
    3. Wait 10 seconds.
    4. Start the vehicle and run the engine for 30 seconds.
    5. Turn the ignition to OFF.

Symptom Chart

Symptom Chart

Pinpoint Tests

Pinpoint Test A: Both Low Beams Are Inoperative

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

Normal Operation

Voltage is provided at all times to the low beam relay switch side from 2 sources (the low beam interrupt relay and the high beam relay when neither are energized).

The headlamp switch is supplied voltage from the Central Junction Box (CJB) fuse 158 (10A) when the ignition is in RUN. When the headlamp switch is placed in the HEADLAMPS ON position, voltage is provided to the low beam relay coil to energize the low beam relay. When the low beam relay is energized, voltage is provided through the Battery Junction Box (BJB) fuses 25 (10A) and 23 (10A) to the headlamps.

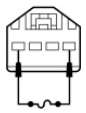
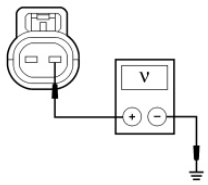
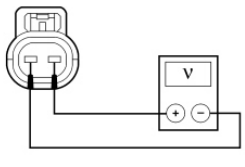
This pinpoint test is intended to diagnose the following:

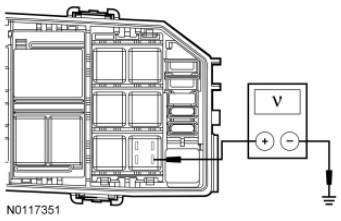
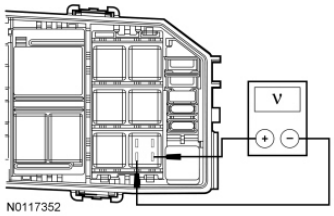
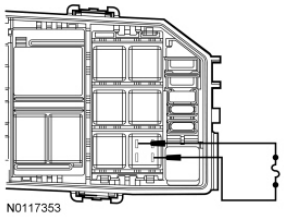
- Fuse
- Wiring, terminals or connectors
- Low beam relay
- Headlamp switch

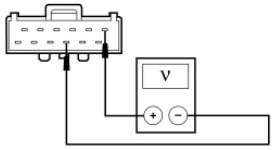
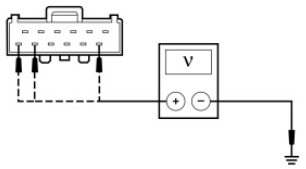
PINPOINT TEST A: BOTH LOW BEAMS ARE INOPERATIVE

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

Test Step	Result / Action to Take
A1 CHECK THE LOW BEAM RELAY	
• Ignition OFF. • Disconnect: Low Beam Relay. • Substitute a known good relay. • Ignition ON. • Place the headlamp switch in the HEADLAMPS ON position. • **Do the headlamps illuminate?**	**Yes** REMOVE the known good relay. INSTALL a new low beam relay. TEST the system for normal operation. **No** REMOVE the known good relay. GO to A2 .
A2 CHECK FOR VOLTAGE TO THE LOW BEAM RELAY SWITCH SIDE	

• **Is the voltage greater than 10 volts?**	
J3 BYPASS THE STOPLAMP SWITCH	
• Connect a fused jumper wire between the stoplamp switch C278-1, circuit 15-LG23 (GN/WH), harness side and the stoplamp switch C278-4, circuit 15S-LG23 (GN/WH), harness side.  N0038807 • **Do the stoplamps illuminate?**	**Yes** REMOVE the jumper wire. INSTALL a new stoplamp switch. REFER to Stoplamp Switch in this section. TEST the system for normal operation. **No** REMOVE the jumper wire. REPAIR stoplamp switch output circuit for an open. TEST the system for normal operation.
J4 CHECK FOR VOLTAGE TO THE HIGH MOUNTED STOPLAMP	
• Disconnect: High Mounted Stoplamp C904. • While applying the brake pedal, measure the voltage between the high mounted stoplamp C904-1, circuit 15S-LG6 (GN/YE), harness side and ground.  N0105119 • **Is the voltage greater than 10 volts?**	**Yes** GO to J5 . **No** REPAIR circuit 15S-LG6 (GN/YE) for an open. TEST the system for normal operation.
J5 CHECK FOR VOLTAGE TO THE HIGH MOUNTED STOPLAMP USING THE CONNECTOR GROUND	
• While applying the brake pedal, measure the voltage between the high mounted stoplamp C904-1, circuit 15S-LG6 (GN/YE), harness side and the high mounted stoplamp C904-2, circuit 31-LG6 (BK), harness side.  N0105120 • **Is the voltage greater than 10 volts?**	**Yes** INSTALL a new high mounted stoplamp. REFER to High Mounted Stoplamp in this section. TEST the system for normal operation. **No** REPAIR circuit 31-LG6 (BK) for an open. TEST the system for normal operation.
J6 CHECK FOR VOLTAGE TO THE REAR LAMP	

• **Do the front fog lamps illuminate?**	**No** REMOVE the known good relay. GO to R2 .
R2 CHECK FOR VOLTAGE TO THE FRONT FOG LAMP RELAY	
• Ignition OFF. • Measure the voltage between the front fog lamp relay pin 3, circuit 29-LD1 (OG/YE), CJB face side and ground.  N0117351 • **Is the voltage greater than 10 volts?**	**Yes** GO to R3 . **No** VERIFY the CJB fuse 147 (15A) is OK. If OK, REPAIR circuit 29-LD1 (OG/YE) for an open. TEST the system for normal operation. If not OK, REFER to the Wiring Diagrams Manual to identify the possible causes of the circuit short.
R3 CHECK THE FRONT FOG LAMP RELAY GROUND CIRCUIT FOR AN OPEN	
• Measure the voltage between the front fog lamp relay pin 3, circuit 29-LD1 (OG/YE), CJB face side and the front fog lamp relay pin 2, circuit 91-LD8 (BK/OG), CJB face side.  N0117352 • **Is the voltage greater than 10 volts?**	**Yes** GO to R4 . **No** REPAIR circuit 91-LD8 (BK/OG) for an open. TEST the system for normal operation.
R4 BYPASS THE FRONT FOG LAMP RELAY	
• Connect a fused jumper wire between the front fog lamp relay pin 3, circuit 29-LD1 (OG/YE), CJB face side and the front fog lamp relay pin 5, circuit 15S-LD1 (GN/YE), CJB face side.  N0117353	**Yes** REMOVE The jumper wire. GO to R5 . **No** REMOVE The jumper wire. REPAIR circuit 15S-LD1 (GN/YE) for an open. TEST the system for normal operation.

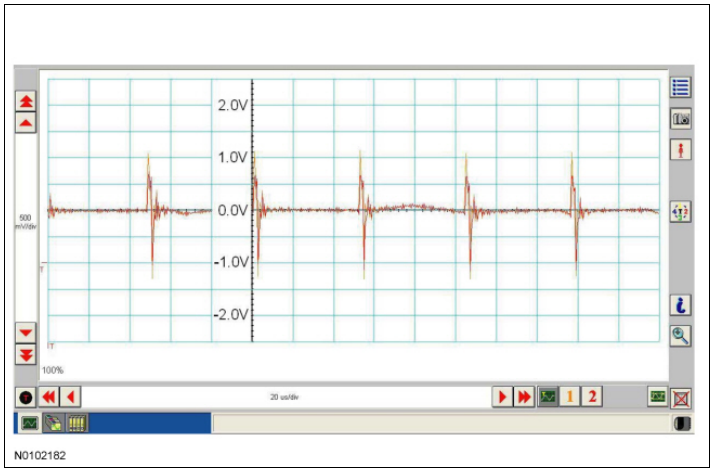
AD2 CHECK THE CUSTOMER ACCESS BLOCK CONNECTOR GROUND CIRCUIT FOR AN OPEN	
• Measure the voltage between the customer access block connector C3509-6, circuit 30-NC12 (RD), harness side and the customer access block connector C3509-10, circuit 31-LG12 (BK), harness side.  N0129229 • **Is the voltage greater than 10 volts?**	**Yes** GO to AD3 . **No** REPAIR the circuit. TEST the system for normal operation.
AD3 CHECK THE CUSTOMER ACCESS BLOCK CONNECTOR HOT IN RUN CIRCUITS FOR AN OPEN	
• Ignition ON. • Measure the voltage between the customer access block connector, harness side and ground as follows: **Connector-Pin** / **Circuit** C3509-7 — 14-NC12 (VT/YE) C3509-8 — 14-NC12 (VT/YE) C3509-12 — 30S-FA73 (RD/BU)  N0129230 • **Are the voltages greater than 10 volts?**	**Yes** The vehicle is operating correctly. The concern is with the customer installed components or circuitry. **No** VERIFY the CJB fuses 139 (20A), 144 (10A) and 149 (10A) are OK. If OK, REPAIR the circuit in question. TEST the system for normal operation. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

Pinpoint Test AE: The Courtesy Lamps Do Not Turn On From The Customer-Installed Component

Refer to Wiring Diagrams Cell 140 , Customer Access for schematic and connector information.

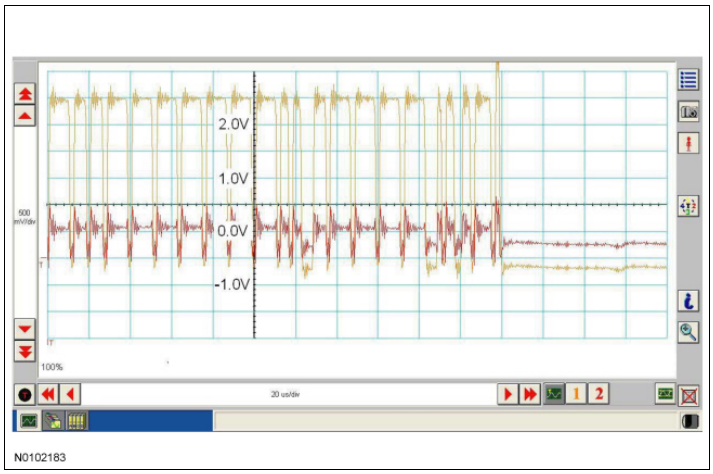
Normal Operation

The Generic Electronic Module (GEM) ground controlled circuit for the courtesy lamps is spliced and provided to the customer access block connector. This allows the customer-installed equipment to turn the interior courtesy lamps on.



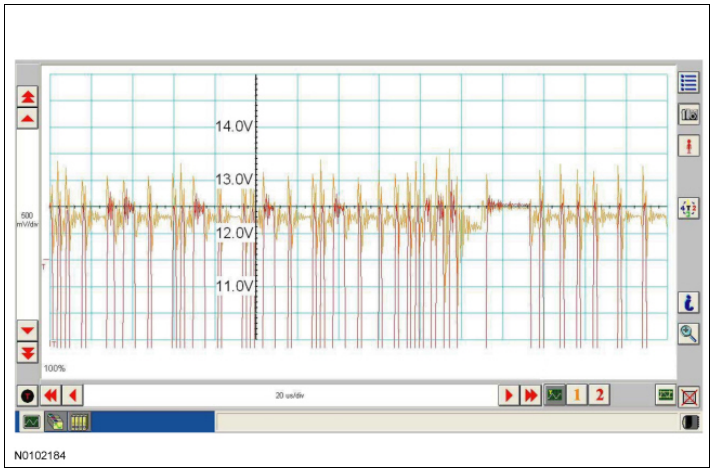
In the event that the data (+) circuit becomes shorted to ground, both the data (+) and data (-) circuits are pulled low (0V) and all communication capabilities are lost.

CAN (-) Circuit Shorted To Ground

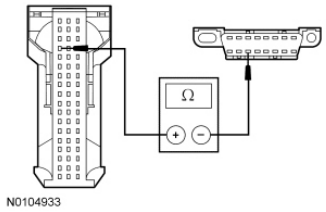


In the event that the data (-) circuit becomes shorted to ground, the data (-) circuit is pulled low (0V) and the data (+) circuit reaches near-normal peak voltage (3.0V) during communication but falls to 0V instead of normal base voltage (2.5V). Communication may continue but at a degraded level.

CAN (+) Circuit Shorted To Battery Voltage



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

C251-11, circuit 5-EC1 (BU/RD)/5-EC13 (BU/WH)/5-EC14 (BU/BK), harness side.  • **Are the resistances less than 5 ohms?**	
F4 CHECK FOR CORRECT SRM OPERATION	
• Disconnect the SRM connector. • Check for: ♦ corrosion ♦ damaged pins ♦ pushed-out pins • Connect the SRM connector and make sure it seats correctly. • Verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SRM . REFER to Section 415-00 . CLEAR the DTCs. REPEAT the network test with the scan tool. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

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

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

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

Normal Operation

The Accessory Protocol Interface Module (APIM) communicates with the scan tool through the High Speed Controller Area Network (HS-CAN).

This pinpoint test is intended to diagnose the following:

- Fuse
- Wiring, terminals or connectors
- APIM

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

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

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

• Enter the following diagnostic mode on the scan tool: Network Test. • Repeat the network test. • **Do all other modules pass the network test?**	

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

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

Normal Operation

The High Speed Controller Area Network (HS-CAN) uses an unshielded twisted pair cable

This pinpoint test is intended to diagnose the following:

- Fuse
- Wiring, terminals or connectors
- Data Link Connector (DLC)
- ABS module
- Accessory Protocol Interface Module (APIM) (SYNCÂ®)
- Instrument Cluster (IC)
- Steering Angle Sensor Module (SASM) (if equipped)
- PCM

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

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

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

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
N1 CHECK THE DLC PINS FOR DAMAGE	
• Ignition OFF. • Inspect DLC pins 6 and 14 for damage.	**Yes** GO to N2 . **No** REPAIR the DLC as necessary. CLEAR the DTCs. REPEAT the network test with the scan tool.

A PATS no-start may involve a vehicle no-start due to either the fuel injectors not operating or the starter not operating (or both). If the PATS anti-theft indicator does not prove-out and one (or both) of the previous conditions are present, it may be due to a PATS issue. If the anti-theft indicator proves-out, and the vehicle does not start, it is probably not a PATS issue. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. If the anti-theft indicator does not illuminate at all, it may be an IC issue. GO to Symptom Chart in this section. A low battery voltage may cause the PATS to allow starter operation, but may keep the fuel injectors from operating.

Passive Anti-Theft System (PATS) Transceiver

The PATS transceiver is located under the steering column shroud and communicates with the encoded ignition key. During each vehicle start sequence, the PATS transceiver reads the encoded ignition key identification code and sends the data to the IC . The IC validates the code, and if it is the correct code, the IC sends a message to the PCM to ground the starter relay solenoid coil and to also allow the fuel injectors to operate. Refer to Passive Anti-Theft System (PATS) Transceiver in this section.

Passive Anti-Theft System (PATS) Operation

NOTE: If the IC or the PCM is being replaced (or both), the parameters must be reset in both modules or the vehicle experiences a PATS no-start. This occurs even if the vehicle is not equipped with PATS . PATS vehicles and non- PATS vehicles have parameters in the IC and the PCM and they must be reset whenever either (or both) module(s) is (are) replaced. Refer to Passive Anti-Theft System (PATS) Parameter Reset in this section.

When the PATS key is turned to the ON or START position, the IC initiates the key interrogation sequence by sending a voltage signal to the PATS transceiver. The transceiver then uses its antenna to bounce a signal off the transponder in the PATS key. This process "reads" the PATS key identification code and sends the key identification code back to the IC , which interprets it and determines if it matches one of the stored key codes. If it does match one of the stored key codes, the IC sends a message to the PCM to ground the starter relay solenoid coil and to also allow the fuel injectors to operate. If it does not match one of the stored key codes, or it is only a partial key read or no key read, the IC sends a message to the PCM to not ground the starter relay solenoid coil and not allow fuel injector operation. The anti-theft indicator in the IC flashes (or may glow steadily) and the IC stores one or more DTCs.

PATS disables the vehicle from starting if there is:

- a damaged PATS key.
- a non-programmed PATS key.
- a non- PATS key (key has no electronics).
- damaged wiring.
- a damaged transceiver.
- a parameter reset is necessary.
- a damaged IC .
- a damaged PCM.

Passive Anti-Theft System (PATS) PIDs

Monitoring the PATS PIDs can be very useful in determining which diagnostic steps to follow. Viewing the MASTERKEY (verifies if the key is programmed) PID (with both keys) determines if the key is a programmed key and may also be used to prove-out the transceiver, circuitry and the IC . A master key is any key that is programmed into the IC . Viewing the MIN_KEYS (minimum number of keys) PID (this PID does not change) determines the minimum number of keys that must be programmed into the IC . There must be at least 2 keys programmed into the IC in this type of PATS before the vehicle starts. Viewing the N_KEYCODE (number of keys programmed) PID determines if the minimum number of keys have been

Generic Electronic Module (GEM)

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

Principles of Operation

The Generic Electronic Module (GEM) controls various systems (such as turn lamps, interior lighting, power door locks, wipers and the battery saver feature) by monitoring inputs from switches, sensors and messages sent from other modules on the Medium Speed Controller Area Network (MS-CAN). Based on the inputs received, the SJB activates outputs. For example, the SJB monitors the door ajar switches. Based on this input, the SJB may provide voltage to the interior lamps.

Inspection and Verification

1. Verify the customer concern.

2. Visually inspect for obvious signs of electrical damage.

Visual Inspection Chart

Electrical
• Central Junction Box (CJB) fuse 179 (7.5A) Generic Electronic Module (GEM) logic

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4. **NOTE:** Make sure to use the latest scan tool software release.

   If the cause is not visually evident, connect the scan tool to the Data Link Connector (DLC).

Seat Cushion - Front

Driver Seat Cushion

Passenger Seat Cushion

Backrest Removal - Outboard Side

Backrest Removal - Inboard Side

Seat Cushion Components - Removal Steps

Seat Cushion Components - Installation Steps

Seat Cushion - Rear

Cushion Disassembly View

Backrest Removal View

Seat Cushion Components - Removal Steps

Seat Cushion Components - Installation Steps

2012 Transit Connect Contents/Index

GROUP 03: Engine

SECTION 303-12:
Intake Air Distribution and Filtering

2012 Transit Connect Contents/Index

GROUP 09: Exhaust System

SECTION 309-00:
Exhaust System