The system consists of a power transfer unit (PTU), 4X4 control module, rear axle and a solenoid-actuated ATCC device. The module varies the torque sent to the rear wheels by controlling the current sent to the clutch located inside the rear axle.

The 4X4 control module also provides the brake system with its current clutch duty cycle and whether or not the brake system may take command of the clutch duty cycle.

NOTE: The ATCC solenoid is not repairable. If a new component is required, the ATCC solenoid and rear axle are installed as an assembly. Refer to REAR DRIVE AXLE/DIFFERENTIAL article.

The PTU is a gearbox that attaches to the transaxle. The RH intermediate shaft passes through the PTU and engages the differential side gear as in normal front wheel drive (FWD) applications. The transaxle differential drives the PTU. The PTU then drives the driveshaft at all times. The driveshaft drives one half of the rear axle clutch pack. The other half of the rear axle clutch pack drives the rear axle ring and pinion.

The active, on-demand AWD system uses data from other systems as inputs to the 4X4 control module. The 4X4 control module uses the inputs to determine the appropriate amount of current to send to the ATCC solenoid that delivers the desired torque to the rear wheels. Specific inputs to the 4X4 control module are:

- Accelerator pedal position via the high-speed controller area network (HS-CAN)
- Transaxle range from the PCM via the HS-CAN
- Brake system status from the ABS module via the HS-CAN
- Wheel speed from all 4 wheels from the ABS module via the HS-CAN

4X4 control module outputs are:

- Solid-state clutch (pulse-width modulated signal) to the ATCC solenoid
- Percent of torque transfer commanded signal to the ABS module via the HS-CAN
- Torque request available signal to the ABS module via the HS-CAN

Heat Protection Mode - During very extreme off-road operation, the AWD system utilizes a heat protection mode to protect the active torque control coupling (ATCC) solenoid (part of rear axle) from damage. If the system detects an overheat condition, it enters a locked mode. If the heat in the system continues to rise once in the locked mode, the 4X4 control module disables the ATCC solenoid. Allow the system to cool down at least 10 minutes with the ignition switch in the ON position.

Inspection and Verification

1. Verify the customer concern.
2. Inspect for obvious signs of mechanical or electrical damage.

VISUAL INSPECTION CHART

Mechanical	Electrical

YES : REFER to **CHARGING SYSTEM - GENERAL INFORMATION** article for diagnosis of the battery and charging system.

NO : Go to B2.

B2 CHECK FOR LOW VOLTAGE MONITORING THE MODULE SUPPLY VOLTAGE (VBAT_4X4) PID

- Enter the following diagnostic mode on the diagnostic tool: DataLogger - 4X4 Control Module
- Monitor the battery voltage VBAT_4X4 PID.
- **Is the battery voltage less than 9 volts?**

  YES : Go to B4.

  NO : Go to B3.

B3 CHECK FOR A BLOWN FUSE

- Check the following smart junction box (SJB) fuses:
  - 11 (10A).
  - 35 (10A).
- **Are the fuses open?**

  YES : INSTALL a new fuse(s). CLEAR the DTCs. REPEAT the self-test.

  NO : Go to B4.

B4 CHECK FOR CORRECT VOLTAGE AT THE BATTERY

- Measure the voltage between the battery positive terminal and ground.
- **Is the voltage greater than 10 volts?**

  YES : Go to B5.

  NO : REFER to **CHARGING SYSTEM - GENERAL INFORMATION** article for diagnosis of the battery and charging system.

B5 CHECK CIRCUIT GD140 (BK/GN) FOR AN OPEN

- Key in OFF position.
- Disconnect: 4X4 Control Module C281
- Measure the resistance between 4X4 control module C281-15, circuit GD140 (BK/GN), harness side and ground.

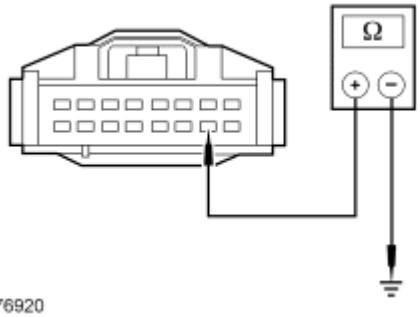


Fig. 1: Checking Circuit GD126 (BK/WH) For An Open
Courtesy of FORD MOTOR CO.

2008 ENGINE PERFORMANCE

Acceleration Control - Edge & MKX

SPECIFICATIONS

TORQUE SPECIFICATIONS

Description	Nm	lb-in
Accelerator pedal and sensor assembly mounting nuts	7	62

DESCRIPTION AND OPERATION

ACCELERATION CONTROL

The acceleration controls consist of an accelerator pedal and sensor assembly.

The engine management system electronically operates the accelerator of the engine in response to accelerator pedal movements initiated by the driver. In the event of a system failure, the engine management system provides a "limp home" mode which allows the vehicle to be driven with limited performance.

DIAGNOSTIC TESTS

ACCELERATION CONTROL

Refer to the **Introduction - Gasoline Engines** article.

REMOVAL AND INSTALLATION

ACCELERATOR PEDAL AND BRACKET

NO : If the passenger air bag module loop 1 resistance PID is less than 1.4 ohms, go to H30.

If the passenger air bag module loop 1 resistance PID is greater than 3.5 ohms, go to H32.

H30 CHECK THE PASSENGER AIR BAG MODULE LOOP 1 FOR LOW RESISTANCE FAULT

NOTE: This pinpoint test step will attempt to change the fault reported by the RCM by inducing a different fault condition. If the fault reported changes, this indicates the RCM is functioning correctly and is not the source of the fault.

- Key in OFF position.
- Depower the SRS. Refer to **Supplemental Restraint System (SRS) Depowering and Repowering**.
- Disconnect: Passenger Air Bag Module C256a
- Repower the SRS. **Do not** prove out the SRS at this time. Refer to **Supplemental Restraint System (SRS) Depowering and Repowering**.
- Key in ON position.
- Enter the following diagnostic mode on the diagnostic tool: Self Test - RCM - Retrieve and Record On-Demand and Continuous Memory DTCs
- Enter the following diagnostic mode on the diagnostic tool: DataLogger - RCM - View and Record the Following Fault PIDs
  - 2293_24_OD (Air Bag Inflator Circuit Resistance Low - Loop No. 1, Front Passenger Side)
  - 2293_25_OD (Air Bag Circuit Open - Loop No. 1, Front Passenger Side)
- **DIAGNOSTIC TIP:** When viewing DTC B2293 on-demand fault PIDs with the passenger air bag module disconnected, open circuit faults would normally be retrieved on loop 1 and loop 2.
- **Did the passenger air bag module loop 1 on-demand fault PIDs change from indicating a low resistance to an open circuit fault?**

  YES : Go to H47.

  NO : Go to H31.

H31 CHECK THE RCM FOR LOW RESISTANCE

- Key in OFF position.
- Depower the SRS. Refer to **Supplemental Restraint System (SRS) Depowering and Repowering**.
- Disconnect: RCM C310a and C310b

SYSTEM WIRING DIAGRAMS article for schematic and connector information.

OCS Weight Sensor Bolt Location

- OCS weight sensor bolt 1, located at the front outboard
- OCS weight sensor bolt 2, located at the rear outboard
- OCS weight sensor bolt 3, located at the rear inboard
- OCS weight sensor bolt 4, located at the front inboard

- **Were any wiring or connector concerns noted?**

  YES : REPAIR the seat connectors and wiring as needed. CARRY OUT the OCS system reset. REFER to **Occupant Classification Sensor (OCS) System Reset**. Go to Z3.

  NO : Go to Z2.

Z2 CHECK THE SEAT TRACK

NOTE: Correct seat track alignment on a passenger front manual seat (if equipped) is critical before removing the seat from the vehicle. During seat installation, the inboard and outboard tracks must be in alignment with each other. Failure to follow this instruction may result in an unsuccessful system reset and incorrect operation of the OCS system.

NOTE: Check for a bent or binding power seat track assembly (if equipped). Position the seat in all positions and check for correct operation after installation of the seat into the vehicle. Failure to follow this instruction may result in an unsuccessful system reset and incorrect operation of the OCS system.

NOTE: The passenger seat bolts must be tightened to the correct specifications and in the correct sequence. Failure to follow this instruction may result in an unsuccessful system reset and incorrect operation of the OCS system. Refer to SEATING article Seat Removal and Installation.

- Loosen the 4 seat track to floor mounting bolts.
- Tighten the seat track-to-floor bolts in the following sequence.
  A. Tighten the front inboard seat track-to-floor bolt to 55 Nm (41 lb-ft).
  B. Tighten the front outboard seat track-to-floor bolt to 55 Nm (41 lb-ft).
  C. Tighten the rear inboard seat track-to-floor bolt to 55 Nm (41 lb-ft).
  D. Tighten the rear outboard seat track-to-floor bolt to 55 Nm (41 lb-ft).
- Carry out the OCS system reset. Refer to **Occupant Classification Sensor (OCS) System Reset**.
- **Did the system reset pass?**

  YES : Fault corrected. Go to Z3.

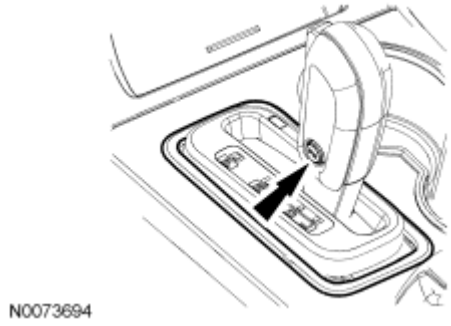


Fig. 3: Identifying Overdrive Switch
Courtesy of FORD MOTOR CO.

Drive with overdrive (O/D) cancel and grade assist is activated when the TC switch is pressed. The TC switch is located on the selector lever knob. When the TC switch is pressed, the 6th gear or O/D upshift is prevented or the transaxle shifts down to 5th gear. The TC switch is meant to be used when driving conditions cause excessive shifting from 6th to other gears such as hilly terrain, mountainous areas or when engine braking is required.

O/D Cancel

- O/D is cancelled.
- The transaxle operates in gears 1 through 5.
- The O/D OFF lamp illuminates on the instrument cluster.

Grade Assist

- Improves vehicle handling in hilly terrain or mountainous areas by providing engine braking and extending lower gear operation on uphill climbs.
- Additional engine braking is provided through the automatic transaxle shift strategy which reacts to vehicle inputs (vehicle acceleration, accelerator pedal, brake pedal and vehicle speed).
- The transaxle will select gears that will provide the engine braking desired, based on the vehicle inputs, this will increase engine RPM during engine braking.

It is recommended to return to DRIVE mode on flat terrain to provide the best fuel economy and transaxle function. The transaxle returns to O/D when the TC switch is pressed again or anytime the key is turned OFF.

Gear Availability

Fig. 78: Identifying Transmission Fluid Level Indicator
Courtesy of FORD MOTOR CO.

18. Route the coolant hoses in the transmission fluid filler tube.

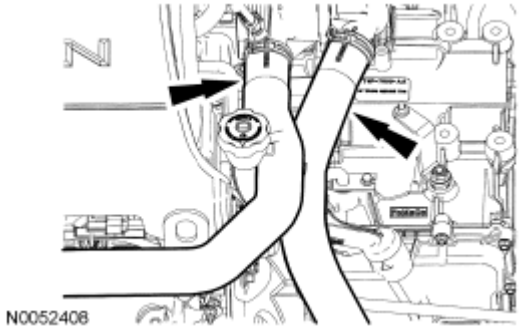


Fig. 79: Identifying Coolant Hoses From Transmission Fluid Filler Tube
Courtesy of FORD MOTOR CO.

19. Position the ACL assembly in place and install the bolt.
    - Tighten to 11 Nm (97 lb-in).

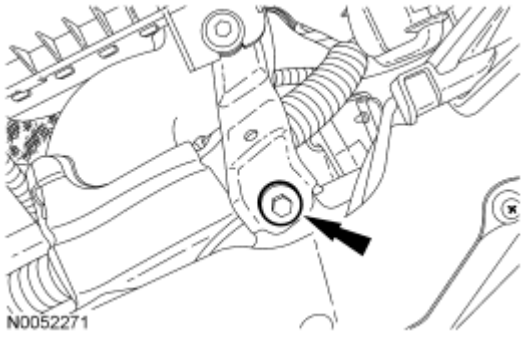
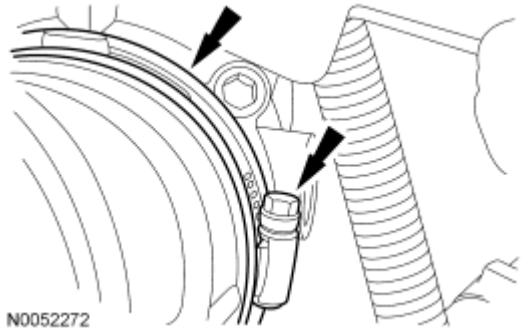


Fig. 80: Locating Air Cleaner Assembly Bracket Bolt
Courtesy of FORD MOTOR CO.

20. Tighten the ACL outlet pipe clamp at the TB.
    - Tighten to 5 Nm (44 lb-in).



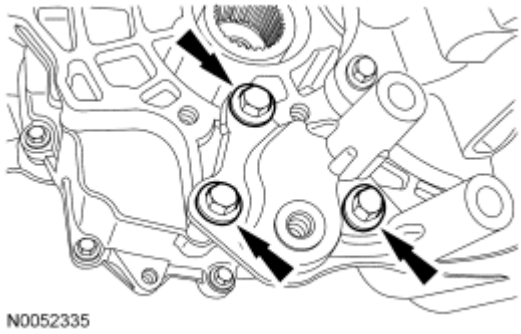


Fig. 254: Locating Transaxle Bracket Bolts
Courtesy of FORD MOTOR CO.

8. Disconnect the Mass Air Flow (MAF) sensor electrical connector and the wiring harness fastener from the Air Cleaner (ACL) assembly.

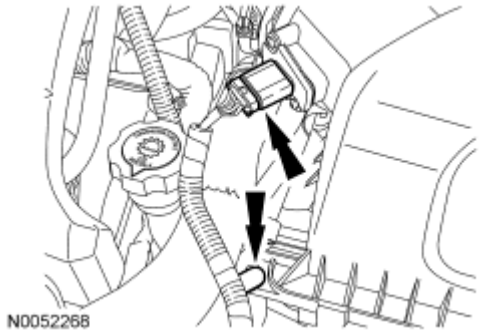


Fig. 255: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener
Courtesy of FORD MOTOR CO.

9. Disconnect the brake booster vacuum hose from the ACL outlet pipe.

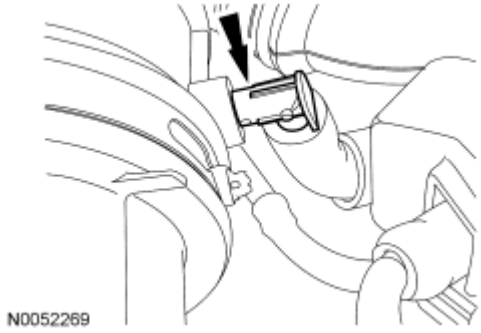


Fig. 256: Locating Brake Booster Vacuum Hose
Courtesy of FORD MOTOR CO.

10. Disconnect the engine breather from the ACL assembly.

8. Remove the transmission fluid level indicator.

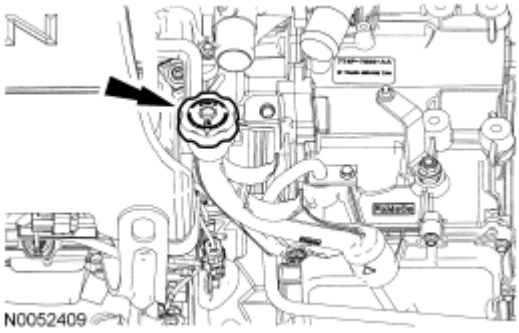


Fig. 432: Identifying Transmission Fluid Level Indicator
Courtesy of FORD MOTOR CO.

NOTE: The coolant hoses have been removed for clarity.

9. Remove the nut, rotate the transmission fluid filler tube counterclockwise 90 degrees and remove the transmission fluid filler tube.

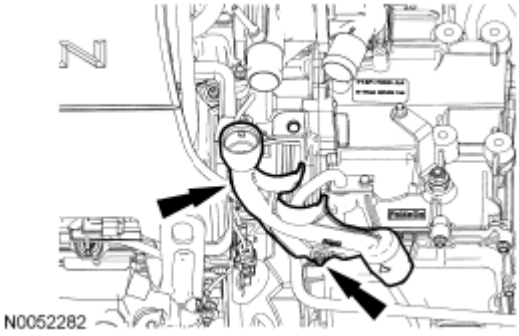


Fig. 433: Identifying Transmission Fluid Filler Tube
Courtesy of FORD MOTOR CO.

10. Disconnect the selector lever cable end from the manual control lever.

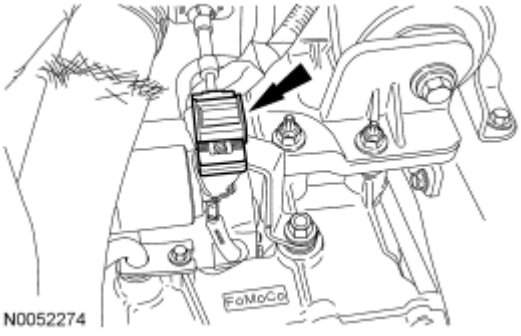


Fig. 434: Locating Selector Lever Cable End From Manual Lever
Courtesy of FORD MOTOR CO.

Inoperative Door Lock Actuator	Connector-Pin	Circuit
LH front	C525-3	CPL51 (BU/GN)
RH front	C603-3	CPL52 (VT/GY)
LH rear	C704-3	CPL52 (VT/GY)
RH rear	C804-3	CPL52 (VT/GY)

- **Is the voltage momentarily greater than 10 volts?**

  YES : INSTALL a new door latch. REFER to **Door Latch**.

  NO : Go to B4.

B4 CHECK CIRCUIT CPL51 (BU/GN) OR CIRCUIT CPL52 (VT/GY) FOR AN OPEN

- Disconnect: SJB C2280d

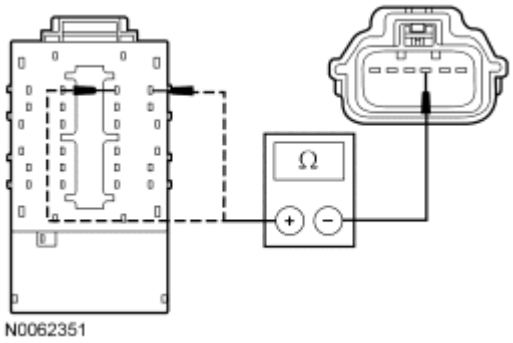


Fig. 7: Measuring Resistance Between SJB, Harness Side & Inoperative Door Lock Actuator, Harness Side
Courtesy of FORD MOTOR CO.

- Measure the resistance between the SJB, harness side and the inoperative door lock actuator, harness side as follows:

SJB Connector-Pin	Inoperative Door Lock Actuator Connector-Pin	Circuit
C2280d-28	LH front C525-3	CPL51 (BU/GN)
C2280d-27	RH front C603-3	CPL52 (VT/GY)

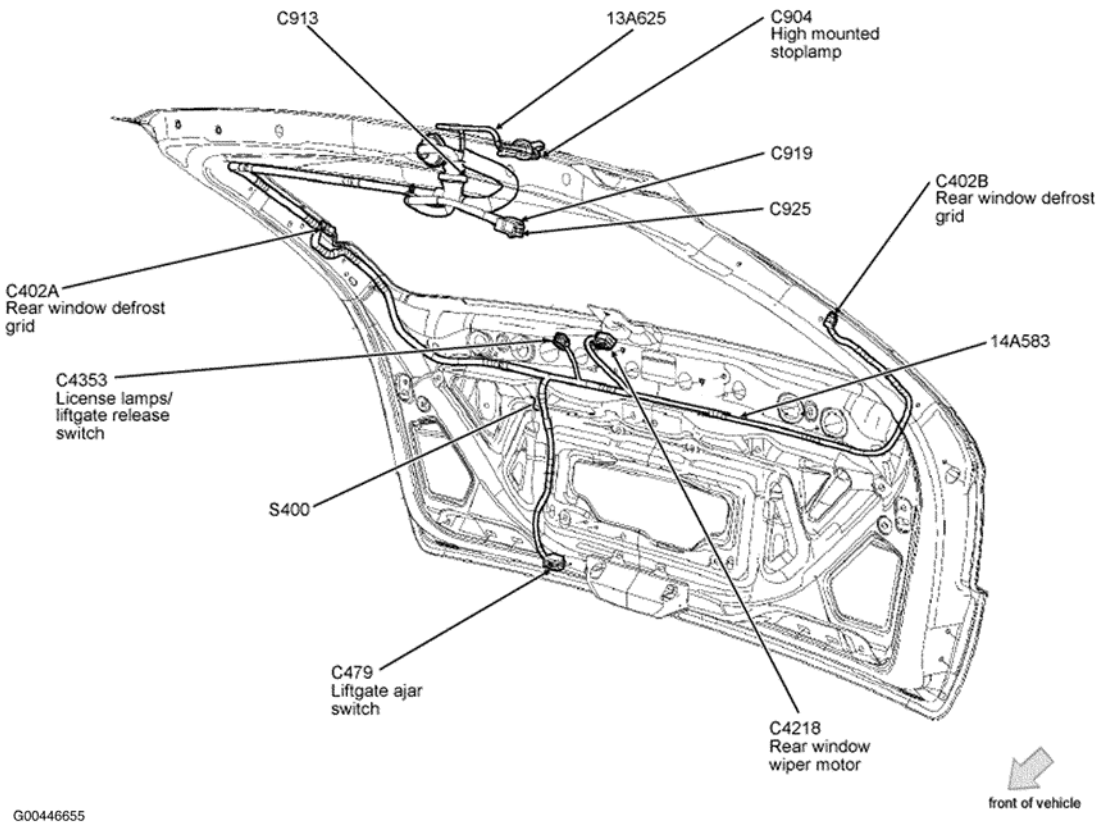


Fig. 26: Liftgate (Edge)
Courtesy of FORD MOTOR CO.

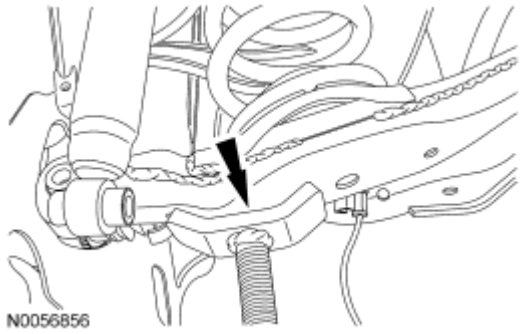


Fig. 145: Compressing Plunger Using A Soft-Jawed Vise
Courtesy of FORD MOTOR CO.

NOTE: It may be necessary to rotate the crankshaft slightly to remove slack from the timing chain and install the tensioner.

18. Install the primary tensioner and the 2 bolts.
    - Tighten to 10 Nm (89 lb-in).
    - Remove the lockpin.

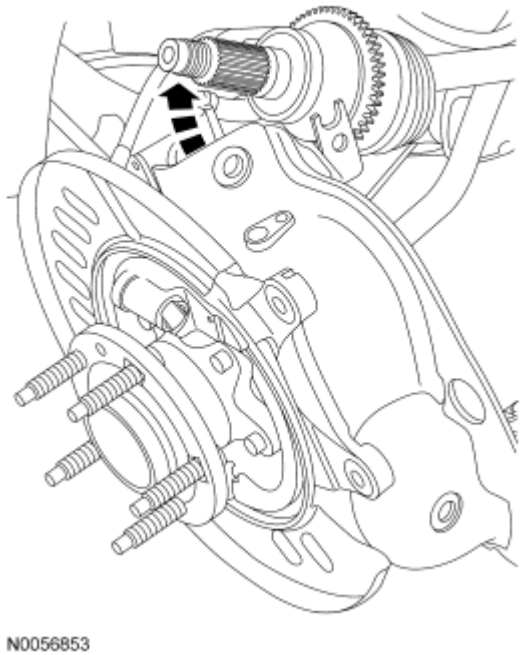


Fig. 146: Locating Primary Tensioner Bolts
Courtesy of FORD MOTOR CO.

19. As a post-check, verify correct alignment of all timing marks.

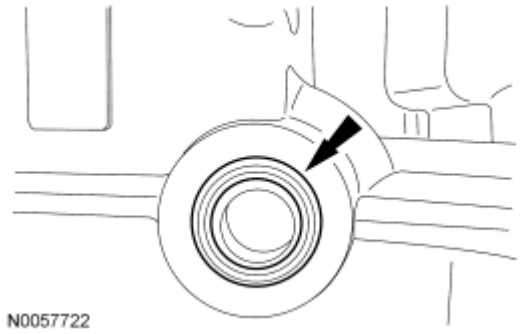


Fig. 813: Installing Special Tool (303-1248) On Flats Of Camshafts
Courtesy of FORD MOTOR CO.

13. Assemble the RH VCT assembly, the RH exhaust camshaft sprocket and the RH secondary timing chain.
    - Align the colored links with the timing marks.

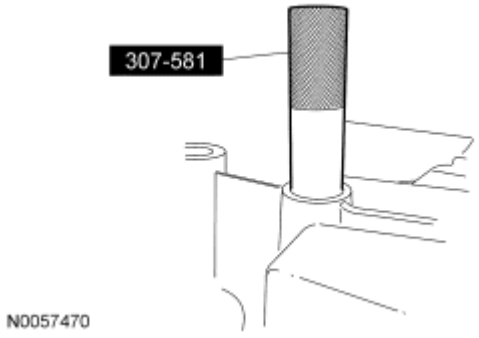


Fig. 814: Aligning RH Exhaust Camshaft Sprocket & RH Secondary Timing Chain Colored Links With Timing Marks
Courtesy of FORD MOTOR CO.

14. Position the RH secondary timing assembly onto the camshafts.

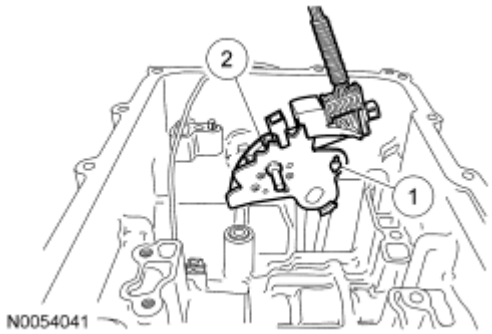


Fig. 815: Positioning RH Secondary Timing Assembly Onto Camshafts
Courtesy of FORD MOTOR CO.

15. Install 2 new bolts and the original washer. Tighten in 4 stages.
    - Stage 1: Tighten to 40 Nm (30 lb-ft).

- Measure the resistance between the suspect speaker, harness side and the DSP module, harness side; and between the suspect speaker, harness side and ground as follows:

Suspect Speaker	Speaker Connector- Pin	DSP Module Connector- Pin	Circuit
LR door	C702-1 C702-2	C4348c-7 C4348c-6	VME09 (WH/GN) RME09 (BN/YE)
LF door	C536-1 C536-2	C4348c-3 C4348c-2	VME28 (BN/VT) RME28 (BN/GN)
LH tweeter	C569-1 C569-2	C4348b-9 C4348b-10	VME08 (GN/OG) RME08 (GY/OG)
LH front imaging	C2359-1 C2359-4	C4348b-2 C4348b-1	VME07 (WH) RME07 (WH/BN)
Center front imaging	C2359-2 C2359-5	C4348b-4 C4348b-3	VME06 (GN) RME06 (GY/YE)
RH front imaging	C2359-3 C2359-6	C4348b-6 C4348b-5	VME10 (WH/VT) RME10 (WH/OG)
RH tweeter	C613-1 C613-2	C4348b-11 C4348b-12	VME11 (VT/OG) RME11 (YE/OG)
RF door	C628-1 C628-2	C4348c-5 C4348c-4	VME29 (GN/WH) RME29 (BU/WH)
RR door	C802-1 C802-2	C4348c-18 C4348c-19	VME12 (BN/WH) RME12 (BN/BU)
Subwoofer 1	C4212-1 C4212-2	C4348c-14 C4348c-15	VME01 (GN/VT) RME01 (GY)
Subwoofer 2	C4212-3 C4212-4	C4348c-16 C4348c-17	VME02 (VT) RME02 (YE)
LH rear center imaging	C4337-1 C4337-2	C4348b-13 C4348b-14	VME30 (GN/BN) RME30 (VT/BN)
RH rear center imaging	C4338-1 C4338-2	C4348b-13 C4348b-14	VME30 (GN/BN) RME30 (VT/BN)

- **Is the resistance less than 5 ohms between the suspect speaker and the DSP module, and greater than 10,000 ohms between the suspect speaker and ground?**

  YES : Go to C4.

  NO : REPAIR the circuit in question. CLEAR any DTCs present. TEST the system for normal operation.

C4 ISOLATE THE SUSPECT SPEAKER

- Key in OFF position.
- Connect: DSP Module C4348b and C4348c

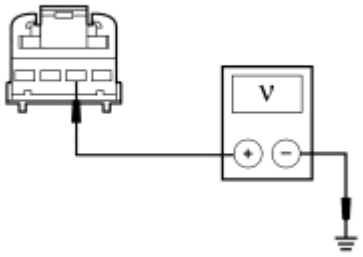


Fig. 41: Checking Circuit For Voltage
Courtesy of FORD MOTOR CO.

- On vehicles with EATC, measure the voltage between the light sensor C286-2, circuit VLF14 (BU/BN), harness side and ground.

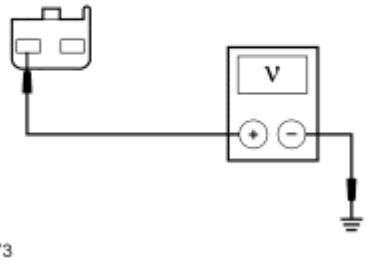


Fig. 42: Checking Circuit For Voltage
Courtesy of FORD MOTOR CO.

- On vehicles with manual climate control, measure the voltage between the light sensor C287-A, circuit VLF14 (BU/BN), harness side and ground.
- **Is the voltage approximately 5 volts?**

  YES : INSTALL a new light sensor. REFER to **Light Sensor**. CLEAR the DTCs. REPEAT the self-test.

  NO : Go to G18.

G16 CHECK FOR VOLTAGE TO THE LIGHT SENSOR (DTC B1793)

- Disconnect: Light Sensor C286 or C287
- Key in ON position.
- Place the headlamp switch in the AUTOLAMPS ON position.