

**2008 Ford Fusion S**

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan &amp; MKZ

**2008 TRANSMISSIONS****Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ****SPECIFICATIONS****MATERIAL****Material**

| Item                                                                                   | Specification | Fill Capacity |
|----------------------------------------------------------------------------------------|---------------|---------------|
| Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye<br>164-R3701 (Rotunda)           | -             | -             |
| Motorcraft Premium Automatic Transmission Fluid<br>XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  | 7.0L (7.4 qt) |
| Multi-Purpose Grease<br>XG-4 and/or XL-5                                               | ESB-M1C93-B   | -             |
| Threadlock and Sealer<br>TA-25                                                         | WSK-M2G351-A5 | -             |
| Ultra Silicone Sealant<br>TA-29                                                        | -             | -             |

**GENERAL SPECIFICATIONS****GENERAL SPECIFICATIONS**

| Item                                                                                                                                                                                                                                                                                                                                                                                                                                           | Specification |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Fluid</b>                                                                                                                                                                                                                                                                                                                                                                                                                                   |               |
| <b>NOTICE: MERCON® V, MERCON® SP, Motorcraft Premium Automatic Transmission Fluid and Motorcraft Continuously Variable Chain Type Transmission Fluid are not interchangeable transmission fluids. The use of any transmission fluid other than what is recommended for this transaxle will cause transaxle damage. Refer to the owner/schedule maintenance publication to determine the correct service interval for the specific vehicle.</b> |               |
| <b>NOTICE: Do not use water-based cleaners to clean or flush the transmission fluid cooler tubes or transaxle damage will occur. Mineral spirits can be used to clean the transmission fluid cooler tubes, providing the transmission fluid cooler tubes are flushed with clean transmission fluid and blown dry with shop air. Use only clean transmission fluid designated for this transaxle.</b>                                           |               |

**GENERAL SPECIFICATIONS****GENERAL SPECIFICATIONS**

| Item                             | Specification                  |
|----------------------------------|--------------------------------|
| <b>Torque Converter End Play</b> |                                |
| New or rebuilt                   | 0.355-1.04 mm (0.014-0.041 in) |
| Used                             | 0.355-1.87 mm (0.014-0.074 in) |

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**Transmission Fluid Filter**

Internal to the transmission

-

**GEAR AND SOLENOID OPERATION CHART****GEAR AND SOLENOID OPERATION CHART**

| <b>Gear</b>        | <b>SSC</b> | <b>SSD</b> | <b>SSE</b> | <b>SSF</b> | <b>SSA</b> | <b>SSB</b> |
|--------------------|------------|------------|------------|------------|------------|------------|
| 1st                | OFF        | ON         | ON         | ON         | OFF        | OFF        |
| 1st Engine Braking | OFF        | ON         | ON         | ON         | ON         | ON         |
| 2nd                | OFF        | ON         | ON         | OFF        | OFF        | OFF        |
| 3rd                | OFF        | ON         | OFF        | ON         | OFF        | OFF        |
| 4th                | OFF        | OFF        | ON         | ON         | OFF        | OFF        |
| 5th                | ON         | OFF        | OFF        | ON         | OFF        | OFF        |
| 6th                | ON         | OFF        | ON         | OFF        | OFF        | OFF        |

**GEAR RATIO****GEAR RATIO**

| <b>Gear</b> | <b>Ratio</b> |
|-------------|--------------|
| 1st         | 4.148 to 1   |
| 2nd         | 2.370 to 1   |
| 3rd         | 1.556 to 1   |
| 4th         | 1.155 to 1   |
| 5th         | 0.859 to 1   |
| 6th         | 0.686 to 1   |
| Reverse     | 3.394 to 1   |
| Final Drive | 3.46 to 1    |

**SHIFT SPEED MANUAL D POSITION 3.0L ENGINE (MINIMUM THROTTLE)****SHIFT SPEED MANUAL D POSITION 3.0L ENGINE (MINIMUM THROTTLE)**

| <b>Manual D</b> | <b>km/h</b> | <b>mph</b> |
|-----------------|-------------|------------|
| 1-2 upshift     | 11-16       | 7-10       |
| 2-3 upshift     | 18-24       | 11-15      |
| 3-4 upshift     | 26-34       | 16-21      |
| 4-5 upshift     | 35-43       | 22-27      |
| 5-6 upshift     | 48-61       | 30-38      |
| 2-1 downshift   | 14-22       | 9-14       |
| 3-2 downshift   | 24-37       | 15-23      |
| 4-3 downshift   | 39-48       | 24-30      |
| 5-4 downshift   | 50-56       | 31-35      |
| 6-5 downshift   | 58-80       | 36-50      |

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**SHIFT SPEED MANUAL L POSITION 3.0L ENGINE (MINIMUM THROTTLE)****SHIFT SPEED MANUAL L POSITION 3.0L ENGINE (MINIMUM THROTTLE)**

| <b>Manual L</b> | <b>km/h</b> | <b>mph</b> |
|-----------------|-------------|------------|
| 1-2 upshift     | 29-39       | 18-24      |
| 2-3 upshift     | 74-89       | 46-55      |
| 3-4 upshift     | 113-130     | 70-81      |
| 4-5 upshift     | N/A         | N/A        |
| 5-6 upshift     | N/A         | N/A        |
| 2-1 downshift   | 21-27       | 13-17      |
| 3-2 downshift   | 61-69       | 38-43      |
| 4-3 downshift   | 100-114     | 62-71      |
| 5-4 downshift   | N/A         | N/A        |
| 6-5 downshift   | N/A         | N/A        |

**SHIFT SPEED MANUAL D POSITION 3.5L ENGINE (MINIMUM THROTTLE)****SHIFT SPEED MANUAL D POSITION 3.5L ENGINE (MINIMUM THROTTLE)**

| <b>Manual D</b> | <b>km/h</b> | <b>mph</b> |
|-----------------|-------------|------------|
| 1-2 upshift     | 14-21       | 9-13       |
| 2-3 upshift     | 21-29       | 13-18      |
| 3-4 upshift     | 33-40       | 20-25      |
| 4-5 upshift     | 49-55       | 30-35      |
| 5-6 upshift     | 65-70       | 40-44      |
| 3-1 downshift   | 7-17        | 4-11       |
| 4-3 downshift   | 26-36       | 16-24      |
| 5-4 downshift   | 38-46       | 24-29      |
| 6-5 downshift   | 56-63       | 35-39      |

**SHIFT SPEED MANUAL L POSITION 3.5L ENGINE (MINIMUM THROTTLE)****SHIFT SPEED MANUAL L POSITION 3.5L ENGINE (MINIMUM THROTTLE)**

| <b>Manual L</b> | <b>km/h</b> | <b>mph</b> |
|-----------------|-------------|------------|
| 1-2 upshift     | 45-55       | 28-34      |
| 2-3 upshift     | 90-100      | 55-62      |
| 3-4 upshift     | 130-138     | 81-86      |
| 4-5 upshift     | 190-198     | 118-123    |
| 2-1 downshift   | 15-23       | 9-14       |
| 3-2 downshift   | 66-75       | 41-47      |
| 4-3 downshift   | 98-110      | 61-68      |
| 5-4 downshift   | 163-175     | 101-109    |

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**STALL SPEED****STALL SPEED**

| Engine    | rpm         |
|-----------|-------------|
| 3.0L (4V) | 1,878-2,678 |
| 3.5L      | 1,878-2,678 |

**SOLENOID RESISTANCE READING****SOLENOID RESISTANCE READING**

| Component                                                                                                                                                           | Readings (ohm) @ 20°C (68°F) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Shift Solenoid A (SSA) and Shift Solenoid B (SSB)                                                                                                                   | 11-15 ohms                   |
| Shift Solenoid C (SSC), Shift Solenoid D (SSD), Shift Solenoid E (SSE), Shift Solenoid F (SSF), Pressure Control Solenoid A (PCA) and Torque Converter Clutch (TCC) | 5.0-5.6 ohms                 |

**CLUTCH AND BRAKE PRESSURE CHART****CLUTCH AND BRAKE PRESSURE CHART**

| Clutch | Range           | Pressure                   |
|--------|-----------------|----------------------------|
| C1     | Drive (1st-4th) | 196-1,372 kPa (28-199 psi) |
| C2     | Drive (4th-6th) | 196-1,372 kPa (28-199 psi) |
| C3     | Drive (3rd-5th) | 196-1,372 kPa (28-199 psi) |
| C3     | Reverse         | 392-1,863 kPa (57-270 psi) |
| B2     | Low, manual 1st | 588-1,372 kPa (85-199 psi) |
| B2     | Reverse         | 392-1,863 kPa (57-270 psi) |

**TORQUE SPECIFICATIONS****TORQUE SPECIFICATIONS**

| Description                                       | Nm | lb-ft | lb-in |
|---------------------------------------------------|----|-------|-------|
| Brake caliper hose retaining bracket bolt         | 22 | 16    | -     |
| Catalyst monitor sensor                           | 48 | 35    | -     |
| Catalytic converter band clamp bolts              | 20 | -     | 177   |
| Catalytic converter band clamp LH half bolts      | 40 | 30    | -     |
| Catalytic converter band clamp RH half nuts       | 20 | -     | 177   |
| Catalytic converter bracket bolts                 | 20 | -     | 177   |
| Catalytic converter support bracket nuts          | 23 | 17    | -     |
| Catalytic converter-to-engine block bracket bolts | 35 | 26    | -     |
| Catalytic converter-to-exhaust manifold nuts      | 40 | 30    | -     |
| Driveshaft bolts                                  | 70 | 52    | -     |
| EGR tube                                          | 40 | 30    | -     |

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|                                                                    |     |     |     |
|--------------------------------------------------------------------|-----|-----|-----|
| EGR valve bolts                                                    | 25  | 18  | -   |
| Exhaust flexible pipe-to-catalytic converter nuts                  | 40  | 30  | -   |
| Front wheel hub nut                                                | 225 | 185 | -   |
| Ground wire bolts                                                  | 12  | -   | 106 |
| Heated Oxygen Sensor (HO2S)                                        | 48  | 35  | -   |
| HO2S bracket bolt                                                  | 12  | -   | 106 |
| Lower control arm nuts                                             | 200 | 148 | -   |
| Main control valve body bolts <sup>a</sup>                         | -   | -   | -   |
| Manual control lever nut                                           | 12  | -   | 106 |
| Power steering gear bolts                                          | 107 | 79  | -   |
| Power steering line bracket retaining bolts                        | 9   | -   | 80  |
| Power steering line bracket-to-cylinder head retaining bolt        | 7   | -   | 62  |
| Power Transfer Unit (PTU) bolts                                    | 90  | 66  | -   |
| PTU support bracket bolts                                          | 70  | 52  | -   |
| RH damper fork through bolt                                        | 103 | 76  | -   |
| RH exhaust manifold heat shield bolts                              | 11  | -   | 97  |
| RH halfshaft bearing support bracket bolts All-Wheel Drive (AWD)   | 23  | 17  | -   |
| RH halfshaft bearing support bracket bolts Front Wheel Drive (FWD) | 55  | 41  | -   |
| Selector lever cable bracket bolts                                 | 12  | -   | 106 |
| Selector lever cable bracket nut                                   | 12  | -   | 106 |
| Stabilizer link nuts                                               | 40  | 30  | -   |
| Starter B+ cable                                                   | 12  | -   | 106 |
| Starter bolts                                                      | 26  | 19  | -   |
| Starter cable (small)                                              | 5   | -   | 44  |
| Subframe nuts                                                      | 150 | 111 | -   |
| Subframe support bracket bolts                                     | 103 | 76  | -   |
| Torque converter nuts                                              | 36  | 27  | -   |
| Transaxle insulator-to-frame bolts <sup>b</sup>                    | 62  | 46  | -   |
| Transaxle roll restrictor bolts <sup>b</sup>                       | 90  | 66  | -   |
| Transaxle support insulator bracket bolt                           | 80  | 59  | -   |
| Transaxle support insulator bracket nuts                           | 80  | 59  | -   |
| Transaxle support insulator bracket through bolt (3.5L engine)     | 130 | 96  | -   |
| Transaxle support insulator-to-bracket bolts (3.0L engine)         | 90  | 66  | -   |
| Transaxle-to-engine bolts (3.0L engine)                            | 40  | 30  | -   |
| Transaxle-to-engine bolts (3.5L engine)                            | 48  | 35  | -   |
| Transmission fluid cooler tubes                                    | 10  | -   | 89  |
| Transmission fluid drain plug                                      | 47  | 35  | -   |
| Transmission fluid fill plug                                       | 39  | 29  | -   |
| Transmission fluid pan bolts                                       | 13  | -   | 115 |
| Transmission Fluid Temperature (TFT) sensor                        | 10  | -   | 89  |
| Transmission Control Module (TCM) sensor                           | 24  | 18  | -   |

|              |    |    |   |
|--------------|----|----|---|
| Y-pipe bolts | 40 | 30 | - |
| Y-pipe nuts  | 40 | 30 | - |

<sup>a</sup> Refer to the procedure.

<sup>b</sup> When reinstalling fasteners originally coated with loctite, clean the fasteners with a wire brush prior to applying new threadlock. Apply threadlock and sealer to threads of the bolt.

## DESCRIPTION AND OPERATION

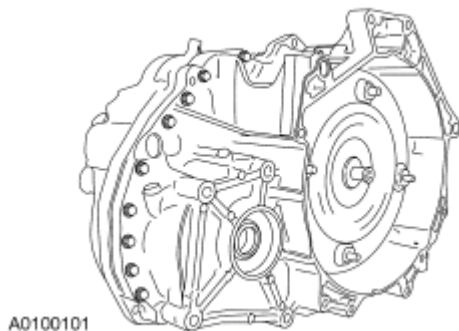
### TRANSAXLE DESCRIPTION

This transaxle is a compact, lightweight, next generation electronically controlled, 6-speed automatic transaxle that employs Ravigneaux-type and one single planetary gear set.

This transaxle contains a high-precision clutch hydraulic control system for a smooth, highly responsive gear shift feel.

All hydraulic functions are directed by electronic solenoids to control:

- engagement feel.
- shift feel.
- shift scheduling.
- modulated Torque Converter Clutch (TCC) applications.
- engine braking, utilizing the coast clutch.



**Fig. 1: Automatic Transmission**  
Courtesy of FORD MOTOR CO.

### IDENTIFICATION TAGS

When servicing the automatic transaxle, use the bar code identification label located on side of the transaxle case.



**Fig. 2: Identifying Identification Tags**  
Courtesy of FORD MOTOR CO.

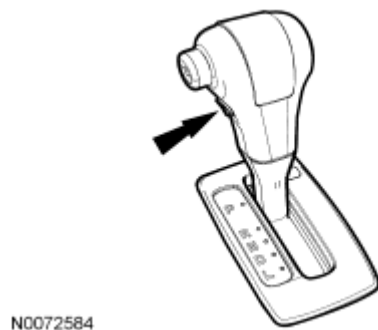
## RANGE SELECTION

**Fusion and Milan** - This transaxle has 5 selector lever positions: P, R, N, D and L.



**Fig. 3: Identifying Range Selection**  
Courtesy of FORD MOTOR CO.

**MKZ** - This transaxle has 5 selector lever positions: P, R, N, D (with an overdrive cancel button) and L.



**Fig. 4: Identifying Range Selection Overdrive Button**  
Courtesy of FORD MOTOR CO.

## Park

In the PARK position:

- there is no powerflow through the transaxle.
- the parking pawl locks the final drive.
- the engine may be started.
- the ignition key may be removed.

**Reverse**

In the REVERSE position:

- the vehicle may be operated in a rearward direction, at a reduced gear ratio.
- engine braking will occur.
- the reverse lamps will be activated.

**Neutral**

In the NEUTRAL position:

- there is no powerflow through the transmission.
- the output shaft is not held and is free to turn.
- the engine may be started.

**Drive**

DRIVE is the normal position for the best fuel economy.

DRIVE provides:

- automatic shifts gears 1st through 6th.
- apply and release of the torque converter clutch.
- maximum fuel economy during normal operation.

**Manual Low (L) Position**

In this position the transaxle will upshift and downshift 1st through 4th gear with extended shift scheduling. Engine braking will occur in 1st through 4th gears.

This position:

- provides increased engine braking during downhill/mountain driving.
- provides extended shift scheduling, allowing both upshifts and downshifts at a higher overall rpm to provide optimum engine braking.
- is not intended for use under extended or normal driving conditions and results in lower fuel economy.

**Overdrive Cancel**

**NOTE:** When pressing the overdrive cancel button (engaged) and using manual low, the transaxle will actually operate in 1st - 3rd gears until either the selector lever is moved out of the manual low position or the overdrive cancel button is turned off (disengaged).

Pressing the overdrive off button on the selector lever handle will allow:

- automatic shifts, gears 1st - 4th.
- increased engine braking.

## **SHIFT PATTERNS**

Based on signals from the sensors, the system controls gear shift lockup.

### **Downshifts**

Under certain conditions the transaxle will downshift automatically to a lower gear range (without moving the selector lever). There are 3 categories of automatic downshifts:

- Coastdown
- Torque demand
- Forced or kickdown shifts

### **Coastdown**

The coastdown downshift occurs when the vehicle is coasting down to a stop.

### **Torque Demand**

The torque demand downshift occurs (automatically) during part throttle acceleration when the demand for torque is greater than the engine can provide at that gear ratio. If applied, the transaxle will disengage the Torque Converter Clutch (TCC) to provide added acceleration.

### **Kickdown**

For maximum acceleration, the driver can force a downshift by pressing the accelerator pedal to the floor. A forced downshift into a lower gear is possible below calibrated speeds. Specifications for downshift speeds are subject to variations due to tire size, engine and transmission calibration requirements.

## **TRANSAXLE OPERATIONAL STRATEGIES**

### **Automatic Gearshift Control**

In automatic gearshift control, based on each gearshift pattern, Shift Solenoid A (SSA) and Shift Solenoid B (SSB) turn ON or OFF and Shift Solenoid C (SSC), Shift Solenoid D (SSD), Shift Solenoid E (SSE) and Shift Solenoid F (SSF) are operated linearly according to information that includes vehicle speed, the degree to which the accelerator is open and brake signal.

**Driver Adaptive Shift Control**

This automatic transaxle does not have a driving mode selection switch that allows drivers to select a mode themselves. The vehicle is ordinarily in adaptive mode. However, when specific conditions are met, the Transmission Control Module (TCM) selects a shifting pattern appropriate to driving conditions from all of the shifting patterns and switches automatically.

- GREEN - Mode 1 - Switched from mode 2 to warm up the transmission fluid. This mode acts to protect the transaxle before the adaptive mode.
- GREEN - Mode 2 - After engine start-up, warm-up speed is increased for a certain period when transmission fluid temperature is low and the vehicle speed is 0.
- HIGH TEMP - When transmission fluid temperature becomes too high, this mode activates lock-up at an earlier timing to stop the temperature rise and lower the temperature.
- DOWN SLOPE - When driving down a slope, the TCM detects a down slope based on the engine control unit signal and output rpm. TCM switches to down slope mode to alleviate the load to the brake by downshifting.

**Gear Shift Control**

When the selector lever is moved from N to D or from N to R, after the engine is started, a shift control solenoid assembly SSC, SSD or SSE is used for the fluid pressure required by C1 clutch or C3 clutch and appropriately regulated fluid pressure is supplied to the clutch, engaging smoothly without shock.

**Reverse Converter Control**

If the selector lever is moved from N to R while the vehicle is moving forward and the transaxle shifts into REVERSE, the wheels will be locked, which is extremely dangerous. In order to avoid this, the TCM inhibits the transaxle from shifting into REVERSE while moving forward.

**Torque Converter Clutch (TCC)**

Based on output rpm signals, signals from the engine control unit (engine rpm and throttle opening) and vehicle speed, a smooth engagement is carried out through linear control of the Torque Converter Clutch (TCC) solenoid. Also, the slip rate is detected by adding input rpm signals and slip control is carried out.

- Engagement Control - control is carried out using a TCC solenoid. The TCC solenoid is linearly turned ON and OFF. The clutch inside the torque converter is operated and the pump impeller and turbine runner are connected. Through this, the engine and the transaxle are coupled and engine output is connected directly to the transaxle, eliminating transaxle loss and enhancing fuel economy
- Slip Control - control is carried out using a TCC solenoid. The TCC solenoid is linearly turned ON and OFF and the clutch within the torque converter is operated outside of the engagement range. The clutch slides without being in a completely coupled condition, increasing transaxle efficiency and enhancing fuel economy.

**TORQUE CONVERTER**

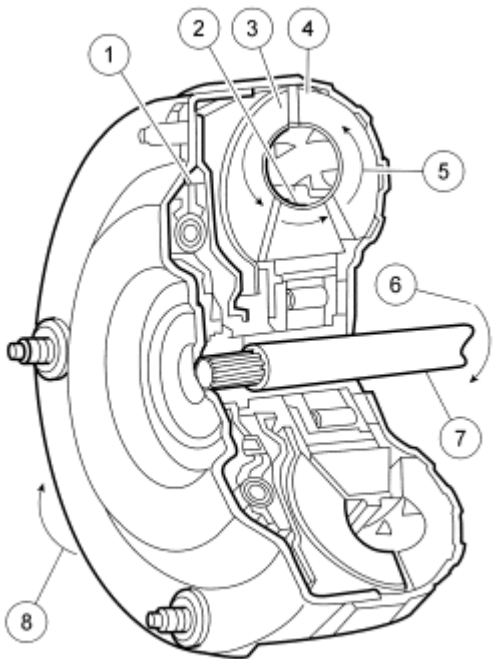
The torque converter transmits and multiplies torque by means of transmission fluid inside the torque converter. The torque converter is composed of the following:

- Converter case
- Pump impeller assembly
- Turbine assembly
- Stator assembly/one-way clutch
- Lock-up clutch

In addition, the use of the lock-up clutch is intended to improve fuel economy as a direct coupling between the engine and the transaxle.

The standard torque converter components operate as follows:

- Rotation of the converter housing and impeller sets the transmission fluid in motion.
- The turbine reacts to the transmission fluid motion from the impeller, transferring rotation to the geartrain through the input shaft.
- The reactor redirects transmission fluid going back into the impeller, providing for torque multiplication.
- The clutch and damper assembly dampens powertrain torsional vibration and provides a direct mechanical connection for improved efficiency.
- Power is transmitted from the torque converter to the planetary gearsets and other components through the input shaft.



N0018686

**Fig. 5: Cut-Away View Of Torque Converter**  
Courtesy of FORD MOTOR CO.

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| Item | Part Number | Description                                |
|------|-------------|--------------------------------------------|
| 1    | -           | Converter clutch and damper (part of 7902) |
| 2    | -           | Reactor (part of 7902)                     |
| 3    | -           | Turbine (part of 7902)                     |
| 4    | -           | Impeller (part of 7902)                    |
| 5    | -           | Transmission fluid motion                  |
| 6    | -           | Transmission input rotation                |
| 7    | -           | Input shaft                                |
| 8    | -           | Engine rotation                            |

### GEARTRAIN

The geartrain consists of the planetary gearsets, apply components, final drive gearset and differential.

### GEAR RATIO

| Gear        | Ratio      |
|-------------|------------|
| 1st         | 4.148 to 1 |
| 2nd         | 2.370 to 1 |
| 3rd         | 1.556 to 1 |
| 4th         | 1.155 to 1 |
| 5th         | 0.859 to 1 |
| 6th         | 0.686 to 1 |
| Reverse     | 3.394 to 1 |
| Final drive | 3.46 to 1  |

### Differential

The differential allows the halfshafts and wheels to rotate at different speeds during cornering.

The differential assembly consists of the following components:

- Differential case (part of the final drive carrier)
- Two pinion gears supported by a pinion shaft
- Two side gears supported by the differential case and halfshafts

When driving in a straight line, both front wheels rotate at relatively the same speed. This means both side gears are rotating at the same speed, as well, while both pinion gears revolve (but do not rotate) with the side gears. During cornering, the wheel on the outside of the turn is forced to rotate faster than the wheel on the inside of the turn. Since the side gears must now rotate at different speeds, the pinion gears rotate on the pinion shaft allowing the drive axles to rotate at different speeds while still transferring output torque.

### APPLY COMPONENTS

**C1 Clutch**

The C1 clutch connects the front planetary carrier to the rear sun gear of the rear planetary set. The C1 clutch is applied in 1st (typical operation during engine braking), 2nd, 3rd and 4th gears.

**C2 Clutch**

The C2 clutch connects the intermediate shaft to the rear planetary carrier. The C2 clutch is applied in 4th, 5th and 6th gears.

**C3 Clutch**

The C3 clutch connects the front planetary carrier to the middle sun gear of the rear planetary set. The C3 clutch is applied in 3rd and 5th gears, and also in REVERSE when the vehicle speed is 7 km/h (4 mph) or less.

**B1 Brake**

The B1 brake locks the middle sun gear of the rear planetary gear set. The B1 brake is applied in 2nd and 6th gears.

**B2 Brake**

The B2 brake locks the rear planetary carrier in REVERSE gear when the vehicle speed is 7 km/h (4 mph) or less.

**F1 One-Way Clutch**

The F1 one-way clutch locks the counterclockwise rotation of the rear planetary carrier during 1st gear operation (during both normal operation and engine braking).

**Hydraulic Systems****Valve Body**

The valve body supplies transmission fluid by switching the transmission fluid circuit for the hydraulic pressure that is generated by the transmission fluid pump. Based on the hydraulic pressure generated by the transmission fluid pump the Transmission Control Module (TCM) sends control signals to the solenoid valves in accordance with vehicle conditions. When the solenoid valve is activated, the control hydraulic pressure to the clutch and brakes is determined (according to the equilibrium with the obtained hydraulic pressure) and gear shift and lockup are accomplished. In addition, an appropriate amount of transmission fluid is supplied to the torque converter, planetary gears and lubricating parts.

**TRANSAXLE ELECTRONIC CONTROL SYSTEM****Electronic System Description**

The Transmission Control Module (TCM) and its input/output network controls the following operations:

- Shift timing
- Line pressure (shift feel)
- Torque Converter Clutch (TCC)

The transaxle control is separate from the engine control strategy in the PCM, although some of the input signals are shared between the TCM and PCM. When determining the best operating strategy for transaxle operation, the TCM uses input information from certain engine-related and driver-demand related sensors and switches supplied by the PCM.

In addition, the TCM receives input signals from certain transaxle-related sensors and switches. The TCM also uses these signals when determining transaxle operating strategy.

Using all of these input signals, the TCM can determine when the time and conditions are right for a shift, or when to apply or release the torque converter clutch. It will also determine the best line pressure needed to optimize shift feel. To accomplish this the TCM uses output solenoids to control transaxle operation.

The following provides a brief description of each of the sensors and actuators used to control transaxle operation.

#### **Transmission Control Module (TCM) Control Function**

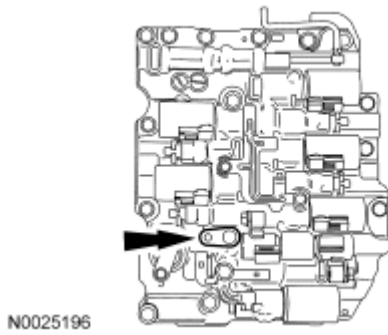
In automatic gear shift control, based on each gear shift pattern, Shift Solenoid A (SSA) and Shift Solenoid B (SSB) turn ON or OFF and Shift Solenoid C (SSC), Shift Solenoid D (SSD), Shift Solenoid E (SSE) and Shift Solenoid F (SSF) are operated linearly according to information that includes vehicle speed, the degree to which the accelerator is open and brake signals. For the gear and solenoid operation chart, refer to **SPECIFICATIONS**.

The Transmission Range (TR) sensor is built in the TCM, it detects the automatic transmission range information via the Hall-effect sensor and outputs the information to the TCM. The TCM reads the voltage and adjusts the automatic transmission range.

#### **Brake Pedal Position (BPP)**

The Brake Pedal Position (BPP) switch tells the PCM when the brakes are applied. The Torque Converter Clutch (TCC) disengages when the brakes are applied and the BPP switch closes when the brakes are applied and opens when they are released.

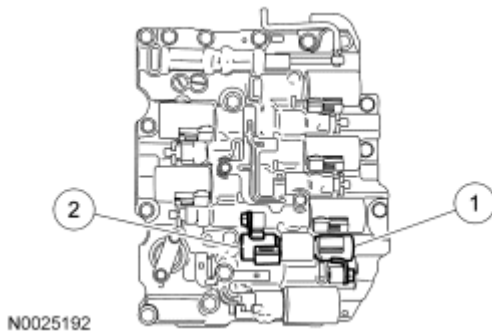
#### **Transmission Fluid Temperature (TFT) Sensor**



**Fig. 6: Locating Transmission Fluid Temperature (TFT) Sensor**  
Courtesy of FORD MOTOR CO.

The Transmission Fluid Temperature (TFT) sensor, which is integrated within the transmission wiring, is installed on the front of the valve body. It directs the transmission fluid temperature within the hydraulic pressure control circuit and transmits a signal based on that temperature to the Transmission Control Module (TCM). Through this it controls gear shift, lockup and slip in response to changes in transmission fluid temperature for smooth shifting across wide fluid temperature zones.

#### Transaxle Shift Solenoids SSA, SSB

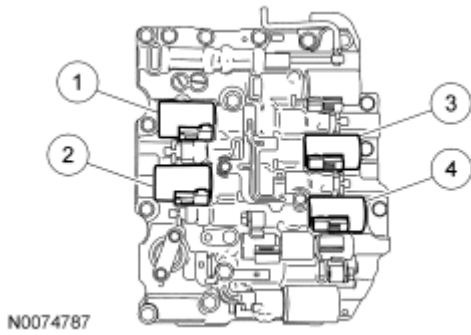


**Fig. 7: Identifying Transaxle Shift Solenoids (SSA, SSB)**  
Courtesy of FORD MOTOR CO.

| Item | Part Number | Description            |
|------|-------------|------------------------|
| 1    | -           | Shift Solenoid A (SSA) |
| 2    | -           | Shift Solenoid B (SSB) |

The transaxle SSA is installed on the middle valve body. The transaxle solenoid assembly SSB is installed on the front valve body. The solenoids turn ON and OFF in response to signals output from the TCM. According to the ON or OFF status of SSA or SSB, the 1st gear engine brake operates or the gear shifts into REVERSE. As a fail-safe function, if any transaxle solenoid assembly abnormality occurs, the TCM will disable the current to the solenoids.

#### Shift Control Solenoids (SSC, SSD, SSE, SSF)

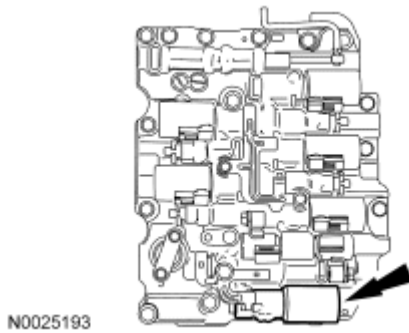


**Fig. 8: Identifying Shift Control Solenoids (SSC, SSD, SSE, SSF)**  
Courtesy of FORD MOTOR CO.

| Item | Part Number | Description            |
|------|-------------|------------------------|
| 1    | -           | Shift Solenoid C (SSC) |
| 2    | -           | Shift Solenoid D (SSD) |
| 3    | -           | Shift Solenoid E (SSE) |
| 4    | -           | Shift Solenoid F (SSF) |

The shift control solenoid assembly (SSC, SSD, SSE, SSF) is installed on the front valve body. The solenoids linearly control hydraulic pressure in response to signals, output from the TCM. Through this, it controls hydraulic pressure to the clutch (C1, C2, C3) and brakes (B1) for smooth shifting. According to the combination of ON or OFF status of the shift control solenoid assembly, the transaxle shifts from 1st gear into 6th gear and vice versa. As a fail-safe function, if any shift control solenoid assembly abnormality occurs, the TCM will disable the current to the shift control solenoids.

#### Pressure Control Solenoid A (PCA)



**Fig. 9: Identifying Pressure Control Solenoid (PCA)**  
Courtesy of FORD MOTOR CO.

The Pressure Control Solenoid A (PCA) is installed on the front valve body. Based on a signal indicating the degree to which the throttle is opened, engine torque, and according to a duty ratio predetermined in the TCM, the solenoids control line hydraulic pressure by linearly changing the comparable throttle hydraulic pressure. Through this, it controls operating hydraulic pressure to the clutch and brakes for smooth shifting. As a fail-safe function, if any shift control solenoid assembly abnormality occurs, the TCM will disable the current to the shift control solenoids. The line pressure is maximized, if the shift control solenoid assembly current is disabled

when any abnormality other than locking occurs.

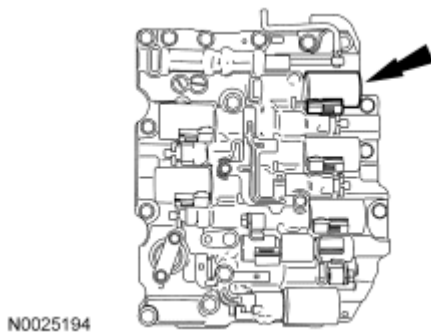
### **Speed Sensor**

The 2 speed sensors are installed in the transaxle case. One speed sensor detects revolutions of the intermediate shaft's C2 drum as input shaft revolutions. The other speed sensor detects the counterdrive gear as output shaft revolutions. These signals are transmitted to the TCM. Based on these signals, the TCM controls engine torque, shift timing and lockup.

### **Adaptive Shift Control**

The TCM has an adaptive learning strategy to electronically control the transaxle which will automatically adjust the shift feel. The first few hundred miles of operation of the transaxle may have abrupt shifting. This is a normal operation. If the battery has been disconnected for any reason it will need to be kept disconnected for approximately 20 minutes to reset the adaptive shift pressure strategy or use the scan tool to carry out the keep alive memory (KAM) reset.

### **Torque Converter Clutch (TCC) Solenoid**



**Fig. 10: Locating Torque Converter Clutch (TCC) Solenoid**  
**Courtesy of FORD MOTOR CO.**

The Torque Converter Clutch (TCC) solenoid is used in the transaxle control system to control the application, modulation and release of the torque converter clutch.

The TCC control solenoid is installed on the front valve body. Based on engine rpm, throttle opening degree signals and speed sensor signals, it linearly controls clutch hydraulic pressure. Through this, engagement and slip are controlled. As a fail-safe function, if any control solenoid assembly abnormality occurs, the TCM will disable the current to the TCC solenoid.

### **Transmission Control (TC) Switch (MKZ)**

The Transmission Control (TC) switch is a momentary contact switch that allows the driver to cancel operation of overdrive.

The TC switch is located on the selector lever.

When the driver initially presses the TC switch, a signal is sent to the PCM.

The PCM uses the shift solenoids to disengage/disable overdrive operation.

At the same time, the PCM illuminates the Transmission Control Indicator Lamp (TCIL) to notify the driver that overdrive is canceled.

When the TC switch is pressed again, overdrive operation is enabled, the converter clutch is released and the TCIL is turned OFF.

Whenever the ignition is cycled (vehicle shut OFF, then started again), the TC switch is turned OFF and overdrive will be enabled, even if the TC switch had been on when the ignition was shut off.

### **Transmission Control Indicator Lamp (TCIL)**

The Transmission Control Indicator Lamp (TCIL) is located in the instrument panel and is labeled Overdrive OFF. It is illuminated in conjunction with the TC switch.

## **DIAGNOSTIC TESTS**

### **DIAGNOSTIC STRATEGY**

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 short cuts 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:

- **Introduction - Gasoline Engines** article
- TSBs
- Wiring Diagrams article

These publications provide the information required when diagnosing transaxle concerns.

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

### **Preliminary Inspection**

- Know and understand the customer's concern.
- Verify the concern by operating the vehicle.
- Check the fluid levels and condition.
- Check for non-factory-installed items and verify correct installation
- Check selector lever linkages for correct adjustment.

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- Check TSBs regarding the concern.
- Carry out Self Tests, both Key ON Engine OFF (KOEO) and Key ON Engine Running (KOER).
- Record all codes.

### Diagnostics

- Carry out on-board diagnostic procedures KOEO and KOER.
- Record all DTCs.
- Repair all non-transaxle codes first.
- Repair all transaxle codes second.
- Erase all continuous codes and attempt to repeat them.
- Repair all continuous codes.
- If only pass codes are obtained, proceed to the **Diagnosis By Symptom** for further information and diagnosis.

Follow the diagnostic sequence to diagnose and repair the concern the first time.

### DIAGNOSTIC FLOW CHART

#### Special Tools

| Illustration                                                                                   | Tool Name                                                                                                                             | Tool Number |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool |             |

Prior to carrying out the flow test, the following items should be checked:

- Know and understand the customer concerns
- Check the transmission fluid level and condition
- Verify the concern by operating the vehicle
- Check for non-factory-installed items and verify correct installation
- Check the selector lever linkage adjustments
- Check technical service bulletins (TSBs) for vehicle concerns
- Carry out Self Tests, both Key ON Engine OFF (KOEO) and Key ON Engine Running (KOER)
- Record all codes
- Verify that the vehicle Transmission Control Module (TCM) is at the latest calibration release level

### DIAGNOSTIC FLOW CHART

| Test              | Result | Action                                    |
|-------------------|--------|-------------------------------------------|
| 1) DTCs recorded? | Yes    | REPAIR all hard DTCs. FOLLOW the pinpoint |

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|                                                                             |     |                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                             | No  | tests. REFER to the <b><u>Introduction - Gasoline Engines</u></b> article first, then this workshop article, then Go to Step 2.<br>REFER to <b><u>Diagnosis By Symptom</u></b> , then Go to Step 5.                                  |
| 2) Are any continuous test memory codes present?                            | Yes | CLEAR codes and CARRY OUT the drive cycle test.                                                                                                                                                                                      |
|                                                                             | No  | Go to Step 4.                                                                                                                                                                                                                        |
| 3) Did the continuous test memory codes reappear?                           | Yes | REPAIR all continuous test memory codes. FOLLOW the pinpoint tests. REFER to the <b><u>Introduction - Gasoline Engines</u></b> article, then the transmission reference article, then this workshop article, then Go to Step 4.      |
|                                                                             | No  | Go to Step 4.                                                                                                                                                                                                                        |
| 4) Is the concern repaired?                                                 | Yes | CARRY OUT the final quick test to verify that no DTCs are present. CLEAR memory codes.                                                                                                                                               |
|                                                                             | No  | REFER to <b><u>Diagnosis By Symptom</u></b> .                                                                                                                                                                                        |
| 5) Was the transmission concern corrected when the scan tool was installed? | Yes | REFER to the <b><u>Introduction - Gasoline Engines</u></b> article, intermittent fault diagnosis part and use the scan tool to diagnose cause of concern in the processor, vehicle harness or external inputs (sensors or switches). |
|                                                                             | No  | REFER to the hydraulic and mechanical routine to diagnose the concern, then Go to Step 6.                                                                                                                                            |
| 6) Is the concern repaired?                                                 | Yes | CARRY OUT the final Self Test to verify that no DTCs are present. CLEAR memory codes.                                                                                                                                                |
|                                                                             | No  | Concern should have been repaired. GO back through the diagnostic flow chart and REVIEW other components that may have contributed to the concern. CHECK and DIAGNOSE those components. GET assistance from other sources.           |

### PRELIMINARY INSPECTION

#### Special Tools

| Illustration                                                                                    | Tool Name                                                                                                                             | Tool Number |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool |             |

#### Material

| Item                                            | Specification |
|-------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid |               |

|                                     |              |
|-------------------------------------|--------------|
| XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A |
|-------------------------------------|--------------|

The following items must be checked prior to beginning the diagnostic procedures.

**Know and Understand the Concern**

In order to correctly diagnose a concern, first understand the customer complaint or condition. Customer contact may be required in order to begin to verify the concern. Understand the conditions as to when the concern occurs. For example:

- Hot or cold vehicle temperature
- Hot or cold ambient temperatures
- Vehicle driving conditions
- Vehicle loaded/unloaded

After understanding when and how the concern occurs, proceed to verifying the concern.

**Verification of Condition**

This part provides information which must be used in both determining the actual cause of customer concerns and carrying out the appropriate procedures.

The following procedures must be used when verifying customer concerns for the transmission.

**Determine Customer Concern**

**NOTE:**        **Some transaxle conditions may cause engine concerns. An Electronic Pressure Control (EPC) short circuit can cause engine misfiring. The Torque Converter Clutch (TCC) not disengaging will stall the engine.**

Determine customer concerns relative to vehicle use and dependent driving conditions, paying attention to the following items:

- Hot or cold vehicle operating temperature
- Hot or cold ambient temperatures
- Type of terrain
- Vehicle loaded/unloaded
- City/highway driving
- Upshift
- Downshift
- Coasting
- Engagement (harsh or soft)
- Noise/vibration - check for dependencies, either rpm dependent, vehicle speed dependent, shift dependent, gear dependent, range dependent or temperature dependent

## Check Transmission Fluid Level and Condition

**NOTE:** The vehicle should not be driven if the transmission fluid level indicator shows the transmission fluid below the DO NOT DRIVE mark or internal failure could result.

If the vehicle has been operated for an extended period of time at highway speeds, in city traffic, in hot weather or while pulling a trailer, the transmission fluid needs to cool down to obtain an accurate reading.

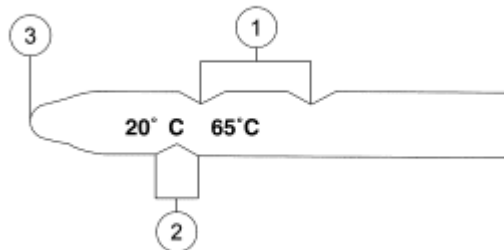
The transmission fluid level reading on the transmission fluid level indicator will differ depending on operating and ambient temperatures. The correct reading should be within the normal operating temperature range.

### Transmission Fluid Level Check

**NOTE:** The transmission fluid should be checked at normal operating temperature 60° C-70°C (140°F-158°F) on a level surface. Normal operating temperature can be reached after approximately 32 km (20 mi) of driving.

Under normal circumstances, the transmission fluid level should be checked during normal maintenance. If the transaxle starts to slip, shifts slowly or shows signs of transmission fluid leaking, the transmission fluid level should be checked.

1. Using the scan tool, verify the correct Transmission Fluid Temperature (TFT) range.
2. With the transaxle in PARK, the engine at idle, foot pressed on the brake, move the selector lever through each gear and allow engagement of each gear. Place the selector lever in the PARK position.
3. Wipe the transmission fluid level indicator cap and remove the transmission fluid level indicator.
4. Wipe the transmission fluid level indicator with a clean cloth.
5. Install the transmission fluid level indicator back in the transmission fluid filler tube until it is fully seated, then remove the indicator. The transmission fluid level should be within the normal operating range.



N0044158

**Fig. 11: Transmission Fluid Level Check**  
Courtesy of FORD MOTOR CO.

| Item | Part Number | Description                           |
|------|-------------|---------------------------------------|
|      |             | Transmission fluid level at operating |

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|   |   |                                                     |
|---|---|-----------------------------------------------------|
| 1 | - | temperature 60°C-70°C (140°F-158°F)                 |
| 2 | - | Transmission fluid level cold 15°C-25°C (59°F-77°F) |
| 3 | - | Do not drive mark                                   |

### High Transmission Fluid Level

A transmission fluid level that is too high may cause the transmission fluid to become aerated due to the churning action of the rotating internal parts. This will cause erratic control pressure, foaming, loss of transmission fluid from the vent tube and possible transaxle malfunction and/or damage. If an overfill reading is indicated, refer to **Transmission Fluid Drain and Refill**.

### Low Transmission Fluid Level

A low transmission fluid level could result in poor transaxle engagement, slipping, malfunction and/or damage. This could also indicate a leak in one of the transaxle seals or gaskets.

### Adding Transmission Fluid

**NOTE:**        **The use of any other type of transmission fluid than specified could result in transaxle malfunction and/or damage.**

If transmission fluid needs to be added, add transmission fluid in 0.25L (1/2 pt) increments through the transmission fluid filler tube. Do not overfill the transmission fluid. For transmission fluid type, refer to **SPECIFICATIONS**.

### Transmission Fluid Condition Check

1. Check the transmission fluid level.
2. Observe the color and the odor. The color under normal circumstances should be a dark red color, not brown or black or have a burnt odor.
3. Hold the transmission fluid level indicator over a white facial tissue and allow the transmission fluid to drip onto the facial tissue and examine the stain.
4. If evidence of solid material is found, the transmission fluid pan should be removed for further inspection.
5. If the stain is a foamy pink color this may indicate coolant in the transaxle. The engine cooling system should also be inspected at this time.
6. If transmission fluid contamination or transaxle failure is confirmed by the sediment in the bottom of the transmission fluid pan, install a new transaxle. If installing a new transaxle the transmission fluid cooler bypass valve, transmission fluid coolers and transmission cooler tubes should be cleaned.
7. Carry out diagnostic checks and adjustments. Refer to **Diagnosis By Symptom**.

### Water in Transmission Fluid

To correctly repair an automatic transaxle that has had water or coolant introduced into the system, only install a new transaxle for the units that cannot be disassembled and cleaned. Prior to installing the transaxle, the transmission fluid cooler(s), transmission fluid cooler tubes and transmission fluid cooler hoses need to be

flushed and cleaned.

## ROAD TESTING VEHICLE

**NOTE:** Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

The Shift Point Road Test and Torque Converter Operation Tests provide diagnostic information on shift controls and torque converter operation.

## SHIFT POINT ROAD TEST

### Special Tools

| Illustration                                                                                 | Tool Name                                                                                                                             | Tool Number |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool |             |

**NOTE:** Shift speed ranges are approximate for all applications.

This test verifies that the shift control system is operating correctly.

1. Bring engine and transaxle up to normal operating temperature.
2. Operate vehicle with selector lever in D range.
3. Using the shift speed charts, apply minimum throttle and observe the speeds at which the transaxle upshifts. The transaxle will upshift 1st through 6th gears.
4. Press the accelerator pedal to the floor, Wide Open Throttle (WOT). The transaxle should downshift to the next lower gear depending on the vehicle speed. The Torque Converter Clutch (TCC) should release.

### SHIFT SPEED MANUAL D POSITION 3.0L ENGINE (MINIMUM THROTTLE)

| Manual D    | km/h  | mph   |
|-------------|-------|-------|
| 1-2 upshift | 11-16 | 7-10  |
| 2-3 upshift | 18-24 | 11-15 |
| 3-4 upshift | 26-34 | 16-21 |
| 4-5 upshift | 35-43 | 22-27 |
| 5-6 upshift | 48-61 | 30-38 |

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|                  |           |           |
|------------------|-----------|-----------|
| 2-1<br>downshift | 14-<br>22 | 9-14      |
| 3-2<br>downshift | 24-<br>37 | 15-<br>23 |
| 4-3<br>downshift | 39-<br>48 | 24-<br>30 |
| 5-4<br>downshift | 50-<br>56 | 31-<br>35 |
| 6-5<br>downshift | 58-<br>80 | 36-<br>50 |

**SHIFT SPEED MANUAL L POSITION 3.0L ENGINE (MINIMUM THROTTLE)**

| <b>Manual<br/>L</b> | <b>km/h</b> | <b>mph</b> |
|---------------------|-------------|------------|
| 1-2<br>upshift      | 29-<br>39   | 18-<br>24  |
| 2-3<br>upshift      | 74-<br>89   | 46-<br>55  |
| 3-4<br>upshift      | 113-<br>130 | 70-<br>81  |
| 4-5<br>upshift      | N/A         | N/A        |
| 5-6<br>upshift      | N/A         | N/A        |
| 2-1<br>downshift    | 21-<br>27   | 13-<br>17  |
| 3-2<br>downshift    | 61-<br>69   | 38-<br>43  |
| 4-3<br>downshift    | 100-<br>114 | 62-<br>71  |
| 5-4<br>downshift    | N/A         | N/A        |
| 6-5<br>downshift    | N/A         | N/A        |

**SHIFT SPEED MANUAL D POSITION 3.5L ENGINE (MINIMUM THROTTLE)**

| <b>Manual<br/>D</b> | <b>km/h</b> | <b>mph</b> |
|---------------------|-------------|------------|
| 1-2<br>upshift      | 14-<br>21   | 9-13       |
| 2-3<br>upshift      | 21-<br>29   | 13-<br>18  |
| 3-4<br>upshift      | 33-<br>40   | 20-<br>25  |
|                     |             |            |

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|                  |           |           |
|------------------|-----------|-----------|
| 4-5<br>upshift   | 49-<br>55 | 30-<br>35 |
| 5-6<br>upshift   | 65-<br>70 | 40-<br>44 |
| 3-1<br>downshift | 7-17      | 4-11      |
| 4-3<br>downshift | 26-<br>36 | 16-<br>24 |
| 5-4<br>downshift | 38-<br>46 | 24-<br>29 |
| 6-5<br>downshift | 56-<br>63 | 35-<br>39 |

### SHIFT SPEED MANUAL L POSITION 3.5L ENGINE (MINIMUM THROTTLE)

| Manual<br>L      | km/h        | mph         |
|------------------|-------------|-------------|
| 1-2<br>upshift   | 45-<br>55   | 28-<br>34   |
| 2-3<br>upshift   | 90-<br>100  | 55-<br>62   |
| 3-4<br>upshift   | 130-<br>138 | 81-<br>86   |
| 4-5<br>upshift   | 190-<br>198 | 118-<br>123 |
| 2-1<br>downshift | 15-<br>23   | 9-14        |
| 3-2<br>downshift | 66-<br>75   | 41-<br>47   |
| 4-3<br>downshift | 98-<br>110  | 61-<br>68   |
| 5-4<br>downshift | 163-<br>175 | 101-<br>109 |

5. If the transaxle fails to upshift/downshift or the Torque Converter Clutch (TCC) does not apply and release, refer to **Diagnosis By Symptom** for possible causes.

### TORQUE CONVERTER DIAGNOSIS

#### Special Tools

| Illustration | Tool Name                                                                                                                   | Tool Number |
|--------------|-----------------------------------------------------------------------------------------------------------------------------|-------------|
|              | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent |             |

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scan tool

Prior to torque converter installation, all diagnostic procedures must be followed. This is to prevent the unnecessary installation of new or remanufactured torque converters. Only after a complete diagnostic evaluation can the decision be made to install a new or remanufactured torque converter.

Begin with the normal diagnostic procedures as follows:

1. Preliminary Inspection
2. Know and Understand the Customer's Concern
3. Verify the Concern - carry out the torque converter operation test
4. Carry out Diagnostic Procedures:
  - Run On-Board Diagnostics. Refer to **Diagnostics**.
    - Repair all non-transaxle related DTCs first.
    - Repair all transaxle DTCs.
    - Rerun On-Board Diagnostic to verify repair.
    - Carry out Line Pressure Test. Refer to **Special Testing Procedures**.
    - Carry out Stall Speed Test. Refer to **Special Testing Procedures**.
    - Carry out diagnostic routines. Refer to **Diagnosis By Symptom**.
    - Use the index to locate the appropriate routine that best describes the symptom(s). The routine will list all possible components that may cause or contribute to the symptom. Check each component listed, diagnose and repair as required, before repairing the torque converter.

### Torque Converter Operation Test

**NOTE:**      **The Torque Converter Clutch (TCC) will not engage if the Transmission Fluid Temperature (TFT) is below 0°C (32°F).**

1. Using the scan tool, make sure that the TFT is within specification 43°C-47°C (109°F-117°F).
2. Accelerate the vehicle to 35-60 km/h (22-37 mph) and maintain a consistent speed.
3. Release the accelerator pedal to close the throttle and press the accelerator to partially open the throttle while monitoring the scan tool engine speed and TCCAMP\_MES. The PID will read 0 when the Torque Converter Clutch (TCC) is released, and 1 when the TCC is applied. The engine speed will increase when the TCC is released and decrease when the TCC is applied.
4. If these actions do not occur, see torque converter operation concerns, refer to **Diagnosis By Symptom**.

### VISUAL INSPECTION

This inspection will identify modifications or additions to the vehicle operating system that may affect

diagnosis. Inspect the vehicle for non-Ford factory add-on devices such as:

- Electronic add-on items:
  - A/C
  - Generator (alternator)
  - Engine turbo
  - Cellular telephone
  - Cruise control
  - CB radio
  - Linear amplifiers
  - Backup alarm signal
  - Computer
- Vehicle modification:
  - These items, if not installed correctly, will affect the PCM or transmission function. Pay particular attention to add-on wiring splices in the PCM harness or transmission wiring harness, abnormal tire size or axle ratio changes.
  - Leaks. Refer to **Leakage Inspection**.
  - Correct selector lever linkage adjustments. Refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article.

#### **Selector Lever Linkage Check**

Hydraulic leakage at the manual control valve can cause delay in engagements and/or slipping while operating if the selector lever linkage is not correctly adjusted. Refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article for selector lever linkage adjustment.

#### **Check TSBs**

Refer to all TSBs which pertain to the concern and follow the procedure.

#### **Carry Out On-Board Diagnostics Key ON Engine OFF (KOEO), Key ON Engine Running (KOER)**

After a road test, with the vehicle warm and before disconnecting any connectors, carry out the Self Test using the scan tool. Refer to the **Introduction - Gasoline Engines** article for diagnosis and testing of the powertrain control system.

### **DIAGNOSTICS**

#### **Special Tools**

| Illustration | Tool Name               | Tool Number             |
|--------------|-------------------------|-------------------------|
|              | 73 III Automotive Meter | 105-R0057 or equivalent |

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ST1137-A



ST2834-A

Vehicle Communication Module and Integrated Diagnostic System software with appropriate hardware, or equivalent scan tool

### Self Diagnosis Function

The Transmission Control Module (TCM) monitors the communication status of each sensor, electronic component and the PCM. If any malfunction should occur, the TCM function warns the driver and stores the malfunction as a diagnosis code.

### Fail-Safe

With the fail-safe function, if any malfunction should occur in the transaxle system, the TCM will output a control signal, and control will be carried out to make traveling a minimum distance possible. If all shift solenoids malfunction, the TCM will cancel the output of control signals to the solenoids. If this happens, the automatic transmission gear shifting will be controlled by transmission fluid pressure circuits only and the gears will shift as shown in the following table.

| Selector Lever Position | Gear Position   |
|-------------------------|-----------------|
| R                       | Reverse         |
| D                       | 3rd or 5th gear |

### On-Board Diagnostic With Scan Tool

**NOTE:** For detailed instruction and other diagnostic methods using the scan tool or equivalent, refer to the scan tool tester article and the [Introduction - Gasoline Engines](#) article.

These Self Tests should be used to diagnose the PCM and should be carried out in order.

- Self Test - Key ON Engine OFF (KOEO)
- Self Test - Continuous Memory Codes
- Self Test - Key ON Engine Running (KOER)
- Special Test Modes
  - Wiggle Test Mode
  - Output Test Mode
- PCM Reset Mode

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- Clearing DTCs P1000
- On-Board Diagnostic (OBD) II Drive Cycle
- Other scan tool features

### DIAGNOSTIC PARAMETERS IDENTIFICATION (PID) CHART

#### Special Tools

| Illustration                                                                                  | Tool Name                                                                                                                 | Tool Number |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------|
| <br>ST2834-A | Vehicle Communication Module and Integrated Diagnostic System software with appropriate hardware, or equivalent scan tool |             |

| PID Name | Description                               | Units                                                                                                                                                                                                                                            |
|----------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TORQUE   | Net engine torque                         | Torque (lb-ft)                                                                                                                                                                                                                                   |
| TCC_AMP  | Torque converter clutch pressure control  | Current (amps)                                                                                                                                                                                                                                   |
| SSE_AMP  | Shift Solenoid Pressure Control E (SSPCE) | Current (amps)                                                                                                                                                                                                                                   |
| TCCPC    | Converter pressure control                | Pressure (psi)                                                                                                                                                                                                                                   |
| SSPCE    | SSPCE                                     | Pressure (psi)                                                                                                                                                                                                                                   |
| SSPCE_F  | SSPCE status                              | <ul style="list-style-type: none"><li>• 00 is not fault detected</li><li>• 01 is short circuit to ground</li><li>• 02 is open circuit load</li><li>• 04 is short circuit to battery power</li><li>• 80 is general (non-specific) fault</li></ul> |
| GEAR_OSC | Gear commanded by output state control    | <ul style="list-style-type: none"><li>• 0 = commanded gear is not controlled by OSC</li><li>• 2 = 1st gear is commanded by OSC</li><li>• 4 = 2nd gear is commanded by OSC</li><li>• 12 = 6th gear is commanded by OSC</li></ul>                  |
| TCC_OSC  | Output state control of torque converter  | <ul style="list-style-type: none"><li>• 00 Torque Converter Clutch (TCC) not controlled by OSC</li><li>• 01 TCC is disengaged by OSC</li><li>• 02 TCC is engaged by OSC</li></ul>                                                                |
|          |                                           | <ul style="list-style-type: none"><li>• 00 is not fault detected</li></ul>                                                                                                                                                                       |

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|            |                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SSPCD_F    | Shift Solenoid Pressure Control D (SSPCD) status | <ul style="list-style-type: none"> <li>• 01 is short circuit to ground</li> <li>• 02 is open circuit load</li> <li>• 04 is short to battery power</li> <li>• 80 is general (non specific) fault</li> </ul>                                                                                                                                                                                                                                                               |
| TSS_SRC    | Turbine Shaft Speed (TSS)                        | rpm                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| OSS_SRC    | Output Shaft Speed (OSS)                         | rpm                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| PCA_F      | Pressure Control Solenoid A (PCA)                | INT                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| SSPCD      | SSPCD                                            | Pressure (psi)                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| PCA        | PCA                                              | Pressure (psi)                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| SSD_AMP    | Shift Solenoid D (SSD)                           | Current (amps)                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| PCA_AMP    | PCA                                              | Current (amps)                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| TP_REL     | Relative throttle position                       | Percentage                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| DTCTCM     | Continuous codes                                 | Number of DTCs                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| TCCSLPDSD  | TCC slip desired                                 | rpm                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| SHFTCTRL   | Shift control                                    | <ul style="list-style-type: none"> <li>• 00 Economy mode</li> <li>• 01 Sport mode</li> <li>• 02 Up slope 1 mode</li> <li>• 03 Up slope 2 mode</li> <li>• 04 Down slope mode</li> <li>• 05 Hot 1 (over temperature 1) mode</li> <li>• 06 Hot 2 (over temperature 2) mode</li> <li>• 07 Cruise mode</li> <li>• 08 Traction mode</li> <li>• 09 1 Position mode</li> <li>• 0A Tiptronic mode</li> <li>• 0B Coast shift</li> <li>• Flexible Fuel (FF) Invalid data</li> </ul> |
| SSPCF_F    | Shift Solenoid Pressure Control F (SSPCF) status | <ul style="list-style-type: none"> <li>• 00 is not fault detected</li> <li>• 01 is short to ground</li> <li>• 02 is open circuit load</li> <li>• 04 is short circuit to battery power</li> <li>• 80 is general (non-specific) fault</li> </ul>                                                                                                                                                                                                                           |
| SSFAMP_MES | Measured current Shift Solenoid F (SSF)          | Current (amps)                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| SSFAMP_CMD | Commanded current SSF                            | Current (amps)                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|            |                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

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|            |                                                  |                                                                                                                                                                                                                                                                               |
|------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SSPCF_CMD  | Commanded pressure SSPCF                         | Pressure (psi)                                                                                                                                                                                                                                                                |
| SSEAMP_MES | Measured current Shift Solenoid E (SSE)          | Current (amps)                                                                                                                                                                                                                                                                |
| SSDAMP_MES | Measured current SSD                             | Current (amps)                                                                                                                                                                                                                                                                |
| SSCAMP_MES | Measured current Shift Solenoid C (SSC)          | Current (amps)                                                                                                                                                                                                                                                                |
| TCCAMP_MES | Measured current for the TCC pressure control    | Current (amps)                                                                                                                                                                                                                                                                |
| PCAAMP_MES | Measured current for PCA                         | Current (amps)                                                                                                                                                                                                                                                                |
| SSPCC_F    | Shift Solenoid Pressure Control C (SSPCC) status | <ul style="list-style-type: none"> <li>• 00 is not fault detected</li> <li>• 01 is short to ground</li> <li>• 02 is open circuit load</li> <li>• 04 is short circuit to battery power</li> <li>• 80 is general (non-specific) fault</li> </ul>                                |
| SSPCC      | SSPCC                                            | Pressure (psi)                                                                                                                                                                                                                                                                |
| SSC_AMP    | SSPCC current                                    | Current (amps)                                                                                                                                                                                                                                                                |
| SSB_F      | Shift solenoid 2 status                          | <ul style="list-style-type: none"> <li>• 00 is not fault detected</li> <li>• 01 is short to ground</li> <li>• 02 is open circuit load</li> <li>• 04 is short circuit to battery power</li> <li>• 40 is stack failure</li> <li>• 80 is general (non-specific) fault</li> </ul> |
| SSA_F      | Shift solenoid 1 status                          | <ul style="list-style-type: none"> <li>• 00 is not fault detected</li> <li>• 01 is short to ground</li> <li>• 02 is open circuit load</li> <li>• 04 is short circuit to battery power</li> <li>• 80 is general (non-specific) fault</li> </ul>                                |
| TFT        | Transmission Fluid Temperature (TFT)             | Temperature (°C, °F)                                                                                                                                                                                                                                                          |
| TRAN_RAT   | Transmission gear ratio                          | Ratio                                                                                                                                                                                                                                                                         |
| TCC_F      | TCC fault                                        | <ul style="list-style-type: none"> <li>• 00 is not fault detected</li> <li>• 01 is short to ground</li> <li>• 02 is open circuit load</li> <li>• 04 is short circuit to battery power</li> <li>• 80 is general (non-specific) fault</li> </ul>                                |

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| VSS        | Vehicle Speed Sensor (VSS)              | Speed (mph)                                                                                                                   |
|------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| TFT        | TFT                                     | Voltage                                                                                                                       |
| TCC_RAT    | Transmission slip ratio                 | Ratio                                                                                                                         |
| TC_SLIPACT | Torque converter slip actual<br>TCCMACT | rpm                                                                                                                           |
| TR         | Transmission Range (TR)                 | <ul style="list-style-type: none"> <li>• P = 7</li> <li>• R = 6</li> <li>• N = 5</li> <li>• D = 4</li> <li>• L = 1</li> </ul> |
| OSS        | OSS                                     | rpm                                                                                                                           |
| TSS        | TSS                                     | rpm                                                                                                                           |
| Gear       | Gear commanded by module                | Gear (1-6)                                                                                                                    |
| VPWRTCM    | Module supply voltage<br>VBAT           | Voltage                                                                                                                       |
| RPMTTCM    | Engine revolutions per<br>minute        | rpm                                                                                                                           |
| TR_V       | TR                                      | Voltage                                                                                                                       |

**TRANSAXLE DRIVE CYCLE TEST**

**NOTE:** Prior to carrying out the Transaxle Drive Cycle Test, make sure that the transaxle is full of transmission fluid or damage to the transaxle may occur.

**NOTE:** Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

After carrying out the Self Test, use the following Transaxle Drive Cycle Test for checking continuous codes:

**NOTE:** The Transaxle Drive Cycle Test must be followed exactly. Malfunctions must occur multiple times consecutively for shift error or Torque Converter Clutch (TCC) code to set.

**NOTE:** When carrying out the Transaxle Drive Cycle Test, see the solenoid operation chart for correct solenoid operation. Refer to Pinpoint Tests - Non OSC Equipped Vehicle.

1. Record and then erase Self Test codes.
2. Warm engine to normal operating temperature.
3. Make sure transmission fluid level is correct.
4. With the selector lever in DRIVE, moderately accelerate from stop to 80 km/h (50 mph). This allows the transaxle to shift into 6th gear. Hold speed and throttle steady for minimum of 15 seconds. Brake to a stop

and remain stopped for minimum of 20 seconds.

5. Repeat Step 4 at least 5 times.
6. Carry out Self Test and record continuous codes.
  - If DTCs are present, refer to **Diagnostic Trouble Code (DTC) Charts**. Service all non-transaxle DTCs first as they can directly affect the operation of the transaxle. Repeat the Self Test and Road Test to verify the correction. Erase DTCs, carry out the Transaxle Drive Cycle Test, and repeat the Self Test after completing service on the DTCs.
  - If the continuous test passes (system pass) and a concern is still present, refer to **Diagnosis By Symptom** and check TSBs for diagnostic concern.

#### After On-Board Diagnostics

**NOTE:** The vehicle wiring harness, PCM and non-transaxle sensors may affect transaxle operations. Service these concerns first.

After the On-Board Diagnostic procedures are completed, service all DTCs.

Begin with non-transaxle related DTCs, then service any transaxle related DTCs. Refer to the **Diagnostic Trouble Code (DTC) Charts** for information on Condition and Symptoms. This chart will be helpful in referring to the correct article(s) and to aid in diagnosing internal transaxle concerns and external non-transaxle inputs. The pinpoint tests are used in diagnosing electrical concerns of the transaxle. Make sure that the vehicle wiring harness and the PCM are diagnosed as well. Refer to the **Introduction - Gasoline Engines** article for diagnosing non-transaxle electronic components. The diagnostic routine hydraulic/mechanical charts will help in diagnosing internal transaxle concerns and external non-transaxle inputs.

#### Before Pinpoint Tests

**NOTE:** Prior to entering pinpoint tests, check the PCM wiring harness for correct connections, bent or broken pins, corrosion, loose wires, correct routing, correct seals and their condition. Check the PCM, sensors and actuators for damage. Refer to the **Introduction - Gasoline Engines** article.

**NOTE:** If a concern still exists after electrical diagnosis has been carried out, refer to **Diagnosis By Symptom**.

If DTCs appear while carrying out the on-board diagnostics, refer to the **Diagnostic Trouble Code (DTC) Charts** for the appropriate repair procedure. Prior to entering pinpoint tests, refer to any TSBs for transaxle concerns.

### DIAGNOSTIC TROUBLE CODE (DTC) CHARTS

#### DIAGNOSTIC TROUBLE CODE (DTC) CHART

| Five Digit DTC | Component | Description | Condition | Symptom | Action |
|----------------|-----------|-------------|-----------|---------|--------|
|                |           |             |           |         |        |

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|       |                                             |                                       |                                                                                           |                                                                                                                  |                                                                                     |
|-------|---------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| P0562 | Battery                                     | System voltage low.                   | PCM detected a voltage level below 9 volts.                                               | No engagements, no adaptive or self-learning strategy.                                                           | CHECK charging system, REFER to <b><u>BATTERY, MOUNTING AND CABLES</u></b> article. |
| P0563 | Battery                                     | System voltage high.                  | PCM detected a voltage level above 18 volts.                                              | No adaptive or self-learning strategy.                                                                           | CHECK charging system, REFER to <b><u>BATTERY, MOUNTING AND CABLES</u></b> article. |
| P0601 | Transmission Control Module (TCM)           | TCM Read-Only Memory (ROM) error.     | TCM detected an internal software concern with ROM.                                       | No engagements, no adaptive or self-learning strategy.                                                           | INSTALL a new TCM.                                                                  |
| P0603 | TCM                                         | TCM Keep Alive Memory (KAM) error.    | TCM detected an internal software concern with KAM.                                       | No engagements, no adaptive or self-learning strategy.                                                           | INSTALL a new TCM.                                                                  |
| P0604 | TCM                                         | TCM Random Access Memory (RAM) error. | TCM detected an internal software concern with RAM.                                       | No engagements, no adaptive or self-learning strategy.                                                           | INSTALL a new TCM.                                                                  |
| P0706 | Transmission Range (TR)                     | TR sensor range or performance error. | TR sensor signal is out of normal range.                                                  | TR sensor indicates a stuck position (D-3rd gear), no adaptive or self learning strategy.                        | INSTALL a new TCM.                                                                  |
| P0707 | TR Sensor                                   | TR sensor circuit low input.          | TR sensor signal is below threshold of 0.127 volt, sensor/circuit electrical malfunction. | TR sensor indicates a stuck position (D-3rd gear), no adaptive or self learning strategy.                        | INSTALL a new TCM.                                                                  |
| P0708 | TR Sensor                                   | TR sensor circuit high input.         | TR sensor signal is above threshold of 4.87 volts, sensor/circuit electrical malfunction. | TR sensor indicates a stuck position (D-3rd gear), no adaptive or self learning strategy.                        | INSTALL a new TCM.                                                                  |
| P0711 | Transmission Fluid Temperature (TFT) Sensor | No change in TFT during operation.    | PCM has detected no TFT change during operation. TFT value stuck at some normal reading.  | TFT indicates 80°C (176°F) at all times, no self learning strategy, no Torque Converter Clutch (TCC) engagement. | Go to <b><u>Pinpoint Test B.</u></b>                                                |
|       |                                             |                                       |                                                                                           |                                                                                                                  |                                                                                     |

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|       |                                            |                                                            |                                                                                                |                                                                                        |                                      |
|-------|--------------------------------------------|------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------|
| P0712 | TFT Sensor                                 | 200°C (329°F) indicated, TFT sensor circuit grounded.      | Voltage drop across TFT sensor exceeds scale set for temperature -43°C (-45°F).                | TFT indicates 80°C (176°F) at all times, no self learning strategy, no TCC engagement. | Go to <b><u>Pinpoint Test B.</u></b> |
| P0713 | TFT Sensor                                 | -43°C (-45°F) indicated, TFT sensor circuit grounded.      | Voltage drop across TFT sensor exceeds scale set for temperature -43°C (-45°F).                | TFT indicates 80°C (176°F) at all times, no self learning strategy, no TCC engagement. | Go to <b><u>Pinpoint Test B.</u></b> |
| P0716 | Turbine Shaft Speed (TSS) Sensor           | TSS range out of performance, insufficient input from TSS. | PCM has detected a loss or noisy TSS signal during operation.                                  | No TCC engagements, no adaptive or self learning strategy.                             | Go to <b><u>Pinpoint Test D.</u></b> |
| P0717 | TSS Sensor                                 | No TSS signal.                                             | PCM has not detected a TSS signal. No TSS signal when Output Shaft Speed (OSS) signal present. | No TCC engagements, no adaptive or self learning strategy.                             | Go to <b><u>Pinpoint Test D.</u></b> |
| P0721 | OSS Sensor                                 | OSS range out of performance, insufficient input from OSS. | PCM has detected a loss or noisy OSS signal during operation.                                  | No adaptive or self learning strategy.                                                 | Go to <b><u>Pinpoint Test C.</u></b> |
| P0722 | OSS Sensor                                 | No OSS signal.                                             | PCM has detected no OSS signal.                                                                | No engagements, no adaptive or self learning strategy.                                 | Go to <b><u>Pinpoint Test C.</u></b> |
| P0729 | Transaxle                                  | 6th gear ratio.                                            | No 6th gear ratio detected by TCM.                                                             | No 6th gear, no TCC engagements, no adaptive or self learning strategy.                | Go to <b><u>Pinpoint Test A.</u></b> |
| P0730 | Clutch Control Solenoids or Internal Parts | Gear ratio error.                                          | PCM has detected a gear ratio error.                                                           | No self learning strategy.                                                             | Go to <b><u>Pinpoint Test A.</u></b> |
| P0731 | Solenoid or Internal Parts                 | 1st gear ratio.                                            | No 1st gear ratio detected by TCM.                                                             | No 1st gear, no TCC engagements, no adaptive or self learning strategy.                | Go to <b><u>Pinpoint Test A.</u></b> |
| P0732 | Solenoid or Internal Parts                 | 2nd gear ratio.                                            | No 2nd gear ratio detected by                                                                  | No 2nd gear, no TCC engagements,                                                       | Go to <b><u>Pinpoint Test A.</u></b> |

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|       |                                         |                                                          |                                                                                                                                                                                                                                                                                                                        |                                                                         |                                              |
|-------|-----------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------|
|       |                                         |                                                          | TCM.                                                                                                                                                                                                                                                                                                                   | no adaptive or self learning strategy.                                  |                                              |
| P0733 | Solenoid or Internal Parts              | 3rd gear ratio.                                          | No 3rd gear ratio detected by TCM.                                                                                                                                                                                                                                                                                     | No 3rd gear, no TCC engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b>         |
| P0734 | Solenoid or Internal Parts              | 4th gear ratio.                                          | No 4th gear ratio detected by TCM.                                                                                                                                                                                                                                                                                     | No 4th gear, no TCC engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b>         |
| P0735 | Solenoid or Internal Parts              | 5th gear ratio.                                          | No 5th gear ratio detected by TCM.                                                                                                                                                                                                                                                                                     | No 5th gear, no TCC engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b>         |
| P0736 | Transaxle                               | Reverse gear ratio.                                      | No reverse gear ratio detected by TCM.                                                                                                                                                                                                                                                                                 | No reverse gear, no self learning strategy.                             | Go to <b><u>Pinpoint Test A.</u></b>         |
| P0780 | Solenoid or Valve Internal to Transaxle | Universal shifting (stuck valve).                        | Valve stuck.                                                                                                                                                                                                                                                                                                           | Increase rpm during shifts. Slipping or erratic shifting.               | Go to <b><u>Main Control Valve Body.</u></b> |
| P0817 | TCM/PCM Starter Circuit                 | Starter disable circuit open or shorted to power/ground. | TCM detected a failure in the starter lock circuit, failed ON or OFF Ignition switch is ON, TCM and PCM communication is normal. No voltage is detected on the start lock circuit for more than 0.1 second or a continuous 12-volt output is detected for more than 0.1 second. Conditions present 2 times to set DTC. | DTC is set. Warning lamp is illuminated.                                | Go to <b><u>Pinpoint Test E.</u></b>         |
| P0961 | Pressure Control Solenoid A (PCA)       | PCA circuit or solenoid failure.                         | PCA circuit or solenoid (SLT) failed during operation.                                                                                                                                                                                                                                                                 | No engagements, no adaptive or self learning strategy.                  | Go to <b><u>Pinpoint Test A.</u></b>         |

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|       |                        |                                                                                          |                                                                                                                                                |                                                        |                                      |
|-------|------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------|
|       |                        |                                                                                          | Incorrect commanded current detected by TCM.                                                                                                   |                                                        |                                      |
| P0962 | PCA                    | PCA solenoid signal or grounded circuits either short or open, solenoid circuit failure. | Voltage through PCA (SLT) is checked. An error will be noted if tolerance is exceeded.                                                         | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0963 | PCA                    | PCA solenoid short to power circuit failure.                                             | Voltage through PCA (SLT) is checked. An error will be noted if tolerance is exceeded.                                                         | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0973 | Shift Solenoid A (SSA) | SSA solenoid or circuit shorted to ground.                                               | Voltage through SSA (S1) circuit is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected.                | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0974 | SSA                    | SSA or circuit shorted to power or open.                                                 | Voltage through SSA (S1) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected. | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0976 | Shift Solenoid B (SSB) | SSB solenoid or circuit shorted to ground.                                               | Voltage through SSB (S2) circuit is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected.                | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0977 | SSB                    | SSB solenoid or                                                                          | Voltage through                                                                                                                                | No engagements, no                                     | Go to <b><u>Pinpoint Test A.</u></b> |

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|       |                        |                                                                                            |                                                                                                                                                  |                                                        |                                      |
|-------|------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------|
|       |                        | circuit shorted to power or open.                                                          | SSB solenoid (S2) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected.          | adaptive or self learning strategy.                    |                                      |
| P0978 | Shift Solenoid C (SSC) | SSC circuit or solenoid failure.                                                           | SSC circuit or solenoid (SLC1) failed during operation. Incorrect commanded current detected by TCM.                                             | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0979 | SSC                    | SSC solenoid signal or grounded circuits either shorted or open, solenoid circuit failure. | Voltage through SSC (SLC1) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected. | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0980 | SSC                    | SSC solenoid or circuit shorted to power.                                                  | Voltage through SSC (SLC1) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected. | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0981 | Shift Solenoid D (SSD) | SSD circuit or solenoid failure.                                                           | SSD circuit or solenoid (SLC2) failed during operation. Incorrect commanded current detected                                                     | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |

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|       |                        |                                                                                   |                                                                                                                                                  |                                                        |                                      |
|-------|------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------|
|       |                        |                                                                                   | by TCM.                                                                                                                                          |                                                        |                                      |
| P0982 | SSD                    | SSD signal or grounded circuits either shorted or open, solenoid circuit failure. | Voltage through SSD (SLC2) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected. | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0983 | SSD                    | SSD or circuit shorted to power.                                                  | Voltage through SSD (SLC2) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected. | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0984 | Shift Solenoid E (SSE) | SSE circuit or solenoid failure.                                                  | SSE circuit or solenoid (SLC3) failed during operation. Incorrect commanded current detected by TCM.                                             | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0985 | SSE                    | SSE signal or grounded circuits either shorted or open, solenoid circuit failure. | Voltage through SSE (SLC3) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected. | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |
| P0986 | SSE                    | SSE or circuit shorted to power.                                                  | Voltage through SSE (SLC3) circuit is checked. An error will be                                                                                  | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b> |

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|       |                                         |                                                                                   |                                                                                                                                                  |                                                        |                                                                                                                                                                                                          |
|-------|-----------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |                                         |                                                                                   | noted if tolerance is exceeded. Short to power failure or open circuit detected.                                                                 |                                                        |                                                                                                                                                                                                          |
| P0997 | Shift Solenoid F (SSF)                  | SSF circuit or solenoid failure.                                                  | SSF circuit or solenoid (SLB1) failed during operation. Incorrect commanded current detected by TCM.                                             | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b>                                                                                                                                                                     |
| P0998 | SSF                                     | SSF signal or grounded circuits either shorted or open, solenoid circuit failure. | Voltage through SSF (SLB1) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected. | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b>                                                                                                                                                                     |
| P0999 | SSF                                     | SSF or circuit shorted to power.                                                  | Voltage through SSF (SLB1) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected. | No engagements, no adaptive or self learning strategy. | Go to <b><u>Pinpoint Test A.</u></b>                                                                                                                                                                     |
| P1573 | Accelerator Pedal Position (APP) Sensor | APP sensor input error.                                                           | PCM has detected an input error from the APP sensor.                                                                                             | No adaptive or self learning strategy.                 | <b>NOTE:</b><br><b>If this DTC is displayed, a malfunction occurred in the vehicle not the TCM. Do not install a new TCM.</b><br><br>REFER to the <b><u>Introduction - Gasoline Engines</u></b> article. |
| P1657 | TCM                                     | TCM                                                                               | Controller Area                                                                                                                                  | No engagements, no                                     | INSTALL a new TCM.                                                                                                                                                                                       |

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|       |                                  |                                           |                                                               |                                                                     |                                                                                                                                                                                                                                                                                |
|-------|----------------------------------|-------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |                                  | communication link error.                 | Network (CAN) link error detected by PCM.                     | adaptive or self learning strategy. Limited fuel and spark.         |                                                                                                                                                                                                                                                                                |
| P1700 | Transaxle                        | Drive engagement error.                   | TCM detected neutral in the DRIVE position.                   | No engagements, no adaptive or self learning strategy.              | REFER to <b><u>Diagnosis By Symptom</u></b> .                                                                                                                                                                                                                                  |
| P1701 | Transaxle                        | Reverse engagement error.                 | TCM detected neutral in the REVERSE position.                 | No self learning strategy.                                          | REFER to <b><u>Diagnosis By Symptom</u></b> .                                                                                                                                                                                                                                  |
| P1719 | PCM                              | Engine torque signal.                     | Torque engine accuracy from PCM inaccurate.                   | Firm shifts and no adaptive learning.                               | PERFORM self-test of PCM. REFER to the <b><u>Introduction - Gasoline Engines</u></b> article to diagnose any DTCs present. If no DTCs, IDENTIFY the driveability symptom present and REFER to the <b><u>Introduction - Gasoline Engines</u></b> article for further diagnosis. |
| P1919 | Engine Coolant Temperature (ECT) | Sensor signal error.                      | PCM/TCM have detected an error in the CAN ECT information.    | No TCC engagements, ECT set to 80°C (176°F).                        | <b>NOTE:</b><br><b>If this DTC is displayed, a malfunction occurred in the vehicle not, the TCM. Do not install a new TCM.</b><br><br>REFER to the <b><u>Introduction - Gasoline Engines</u></b> article.                                                                      |
| P1920 | Engine rpm                       | Engine rpm sensor signal error.           | PCM/TCM have detected an error in the engine rpm information. | No adaptive or self learning strategy. Limited fuel and spark.      | <b>NOTE:</b><br><b>If this DTC is displayed, a malfunction occurred in the vehicle not the TCM. Do not install a new TCM.</b><br><br>REFER to the <b><u>Introduction - Gasoline Engines</u></b> article.                                                                       |
| P2544 | PCM                              | Torque management request input signal A. | Data received from the PCM or engine components are           | Transmission may enable limp-home strategies or increase pressures. | <b>NOTE:</b><br><b>If this DTC is displayed, a malfunction occurred in the vehicle not the</b>                                                                                                                                                                                 |

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|       |              |                                          |                                                                                                                                              |                                                                                                                                                                                                                      |                                                                                                                  |
|-------|--------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|       |              |                                          | not correct for the vehicle operating conditions. Incorrect engine torque calculation may result.                                            | Engine components and PCM may or may not set additional DTCs. P2544, fuel monitor error, ECT sensor failure and Mass Air Flow (MAF) sensor failures may be present. Malfunction Indicator Lamp (MIL) may illuminate. | <b>TCM. Do not install a new TCM.</b><br><br>REFER to the <b><u>Introduction - Gasoline Engines</u></b> article. |
| P2757 | TCC Solenoid | TCC solenoid circuit failure, stuck OFF. | TCC solenoid circuit fails to provide voltage drop across solenoid. Circuit open, shorted or PCM driver failure during on-board diagnostic.  | No TCC engagements, no adaptive or self learning strategy.                                                                                                                                                           | Go to <b><u>Pinpoint Test A.</u></b>                                                                             |
| P2758 | TCC Solenoid | TCC solenoid circuit failure, stuck ON.  | TCC solenoid circuit fails to provide voltage drop across solenoid. Circuit open, shorted or PCM driver failure during on-board diagnostics. | No TCC engagements, no adaptive or self learning strategy.                                                                                                                                                           | Go to <b><u>Pinpoint Test A.</u></b>                                                                             |
| P2762 | TCC Solenoid | TCC circuit or solenoid failure.         | TCC circuit or solenoid failed during operation. Incorrect commanded current detected by TCM.                                                | No engagements, no adaptive or self learning strategy.                                                                                                                                                               | Go to <b><u>Pinpoint Test A.</u></b>                                                                             |
| P2763 | TCC Solenoid | TCC circuit shorted to power.            | TCC solenoid circuit fails to provide voltage drop across solenoid. Circuit                                                                  | No TCC engagements, no adaptive or self learning strategy.                                                                                                                                                           | Go to <b><u>Pinpoint Test A.</u></b>                                                                             |

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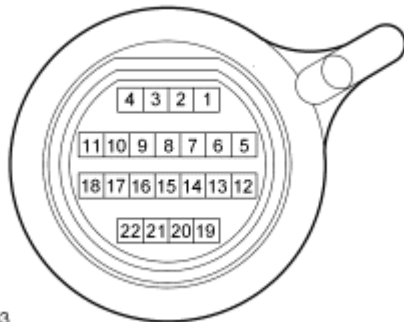
|       |              |                                                                                         |                                                                     |                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------|--------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |              |                                                                                         | shorted to power.                                                   |                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| P2764 | TCC Solenoid | TCC solenoid signal or grounded circuits either short or open solenoid circuit failure. | TCC solenoid circuit fails to provide voltage drop across solenoid. | No TCC engagements, no adaptive or self learning strategy.                                                                       | Go to <b><u>Pinpoint Test A.</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| U0073 | TCM CAN      | TCM communication link error.                                                           | CAN link error detected by PCM.                                     | No engagements, no adaptive or self learning strategy.                                                                           | REFER to <b><u>MODULE COMMUNICATIONS NETWORK</u></b> article.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| U0100 | TCM CAN      | TCM communication link error.                                                           | CAN link error detected by PCM.                                     | No engagements, no adaptive or self learning strategy.                                                                           | <p><b>NOTE:</b><br/>If this DTC is displayed, a malfunction occurred in the vehicle not the TCM. Do not install a new TCM.</p> <p>A module cannot communicate with other modules on the communication network while being reprogrammed. CLEAR any network communication DTCs which may have been set in other modules during reprogramming.</p> <p>CHECK CAN harness between TCM and other modules. For diagnostic information, REFER to the <b><u>Introduction - Gasoline Engines</u></b> article and REFER to <b><u>MODULE COMMUNICATIONS NETWORK</u></b> article.</p> |
| U0101 | TCM/PCM      | TCM Communication error.                                                                | PCM lost communication with the TCM.                                | <ul style="list-style-type: none"> <li>• Engine driveability concerns.</li> <li>• Will turn on MIL and driver warning</li> </ul> | <p><b>NOTE:</b><br/>A module cannot communicate with other modules on the communication network while being reprogrammed. CLEAR any network</p>                                                                                                                                                                                                                                                                                                                                                                                                                          |

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|       |                    |                                                          |                                                                                                      |                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                          |
|-------|--------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |                    |                                                          |                                                                                                      | lamp.                                                                                                                                                                                                                                       | <p><b>communication DTCs which may have been set in other modules during reprogramming.</b></p> <p>CHECK CAN harness between TCM and other modules. For diagnostic information, REFER to the <b><u>Introduction - Gasoline Engines</u></b> article and REFER to <b><u>MODULE COMMUNICATIONS NETWORK</u></b> article.</p> |
| U0121 | ABS                | TCM communication link error.                            | PCM/TCM have detected an error in the CAN wheel rpm information from the ABS system.                 | No engagements, no adaptive or self learning strategy.                                                                                                                                                                                      | <p><b>NOTE:</b></p> <p><b>If this DTC is displayed, a malfunction occurred in the vehicle not the TCM. Do not install a new TCM.</b></p> <p>REFER to <b><u>MODULE COMMUNICATIONS NETWORK</u></b> article.</p>                                                                                                            |
| U0401 | PCM/TCM            | Invalid data received from the PCM or engine components. | Data received from the PCM or engine components is not correct for the vehicle operating conditions. | Transmission may enable limp-home strategies or increase pressures. Engine components and PCM may or may not set additional DTCs. P2544, fuel monitor error, ETC sensor failure and MAF sensor failures may be present. MIL may illuminate. | <p><b>NOTE:</b></p> <p><b>If this DTC is displayed, a malfunction occurred in the vehicle not the TCM. Do not install a new TCM.</b></p> <p>REFER to the <b><u>Introduction - Gasoline Engines</u></b> article.</p>                                                                                                      |
| U0415 | Wheel Speed Sensor | TCM communication link error.                            | PCM/TCM have detected an error in the CAN wheel rpm information from the ABS system.                 | No adaptive or self learning strategy.                                                                                                                                                                                                      | <p><b>NOTE:</b></p> <p><b>If this DTC is displayed, a malfunction occurred in the vehicle not the TCM. Do not install a new TCM.</b></p> <p>REFER to the <b><u>Introduction - Gasoline</u></b></p>                                                                                                                       |

Engines article.

**TRANSAXLE CONNECTOR LAYOUTS**

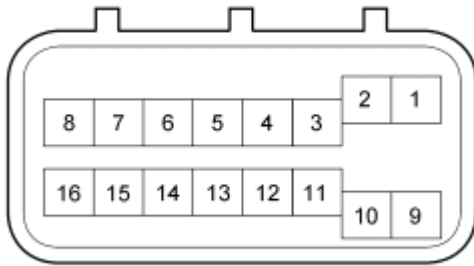
A0093203

**Fig. 12: Transaxle Bulkhead Electrical Connector**

| Pin Number | Circuit | Circuit Function                            |
|------------|---------|---------------------------------------------|
| 1          | -       | Pressure Control Solenoid A (PCA) ground    |
| 2          | -       | Shift Solenoid B (SSB)                      |
| 3          | -       | PCA signal                                  |
| 4          | -       | Torque Converter Clutch (TCC) ground        |
| 5          | -       | Shift Solenoid A (SSA)                      |
| 6          | -       | NOT USED                                    |
| 7          | -       | Transmission Fluid Temperature (TFT) ground |
| 8          | -       | TFT                                         |
| 9          | -       | TCC signal                                  |
| 10         | -       | Shift Solenoid C (SSC) ground               |
| 11         | -       | SSC signal                                  |
| 12         | -       | Turbine Shaft Speed (TSS) sensor signal     |
| 13         | -       | TSS sensor signal ground                    |
| 14         | -       | Shift Solenoid E (SSE) signal               |
| 15         | -       | NOT USED                                    |
| 16         | -       | Shift Solenoid F (SSF) ground               |
| 17         | -       | Shift Solenoid D (SSD) signal               |
| 18         | -       | SSD ground                                  |
| 19         | -       | Output Shaft Speed (OSS) sensor signal      |
| 20         | -       | OSS sensor signal ground                    |
| 21         | -       | SSF signal                                  |
| 22         | -       | SSE ground                                  |

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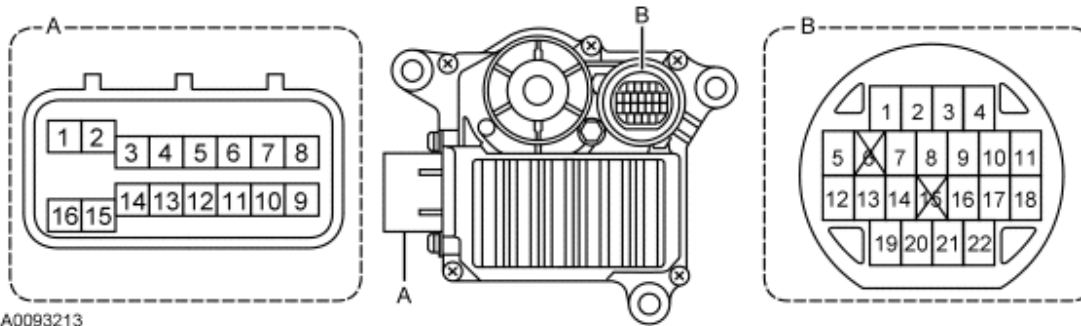
2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ



A0093204

**Fig. 13: Transmission Range (TR) Transmission Control Module (TCM) C1533 (A) Vehicle Harness**  
Courtesy of FORD MOTOR CO.

| Pin Number | Circuit | Circuit Function                         |
|------------|---------|------------------------------------------|
| 1          | -       | Battery feed                             |
| 2          | -       | NOT USED                                 |
| 3          | -       | NOT USED                                 |
| 4          | -       | NOT USED                                 |
| 5          | -       | Start lock signal out                    |
| 6          | -       | Controller Area Network (CAN) -          |
| 7          | -       | NOT USED                                 |
| 8          | -       | NOT USED                                 |
| 9          | -       | Transmission Control Module (TCM) ground |
| 10         | -       | NOT USED                                 |
| 11         | -       | Ignition switch signal input             |
| 12         | -       | NOT USED                                 |
| 13         | -       | NOT USED                                 |
| 14         | -       | CAN +                                    |
| 15         | -       | NOT USED                                 |
| 16         | -       | NOT USED                                 |



A0093213

**Fig. 14: Transaxle Control Module Terminal Testing**  
Courtesy of FORD MOTOR CO.

**NOTE:** For testing, place the positive lead on the terminal with the + sign and place the

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**negative lead on the terminal with the - sign.**

| Pin Number | Pin Acronym         | Descrip- tion                                        | Input / Output to Trans- mission Control Module (TCM) | Measure pins              | Condition For Testing                                 | Reference Value          |
|------------|---------------------|------------------------------------------------------|-------------------------------------------------------|---------------------------|-------------------------------------------------------|--------------------------|
| A1         | B+                  | Battery voltage                                      | -                                                     | +A1 to ground             | Hot at all times                                      | 10-14 volts              |
| A5         | STLK                | Start lock signal output                             | Output                                                | +A5 to -A9                | Ignition ON in PARK<br>Ignition ON in other than PARK | 0-0.8 volt<br>9-14 volts |
| A6         | CAN L               | Controller Area Network (CAN) communi- cation low    | Input/output                                          | +A6 to -A9                | Engine idling                                         | -                        |
| A7         | LIN                 | LIN line communi- cation signal                      | Input                                                 | +A7 to -A9                | -                                                     | -                        |
| A8         | CAN H               | Controller Area Network (CAN) communication high     | Input/output                                          | +A8 to -A9                | Engine idling                                         | -                        |
| A9         | GRND                | Transmission Control Module (TCM) ground             | -                                                     | +ground to chassis ground | -                                                     | -                        |
| A11        | IG                  | Ignition switch signal input                         | Input                                                 | +A11 to -A9               | Ignition ON                                           | 10-14 volts              |
| A14        | K                   | Diagnostic signal                                    | Input/output                                          | +A14 to -A9               | -                                                     | -                        |
| B1         | PCA ground          | Pressure Control Solenoid A (PCA) ground (SLTG)      | -                                                     | -                         | -                                                     | -                        |
| B2         | SSB                 | Shift Solenoid B (SSB) (S2)                          | Output                                                | +B2 to ground             | Vehicle in PARK, engine idling                        | 0-1.5 volts              |
| B3         | PCA                 | PCA                                                  | Output                                                | +B3 to -B1                | Vehicle in PARK, engine idling                        | -                        |
| B4         | TCC solenoid ground | Torque Converter Clutch (TCC) solenoid ground (SLUG) | -                                                     | -                         | -                                                     | -                        |
| B5         | SSA                 | Shift Solenoid A (SSA) (S1)                          | Output                                                | +B5 to ground             | Vehicle in PARK, engine idling                        | 0-1.5 volts              |

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|     |            |                                                          |        |              |                                              |                  |
|-----|------------|----------------------------------------------------------|--------|--------------|----------------------------------------------|------------------|
| B7  | TFT ground | Transmission Fluid Temperature (TFT) sensor ground (OTG) | -      | -            | -                                            | -                |
| B8  | TFT        | TFT sensor (OT)                                          | Input  | +B8 to -B7   | TFT at 10°C to 110°C (50°F to 230°F)         | 4.0 to 0.0 volts |
| B9  | TCC        | TCC solenoid (SLU)                                       | Output | +B9 to -B4   | Vehicle in PARK, engine idling               | -                |
| B10 | SSC ground | Shift Solenoid C (SSC) ground (SLC1G)                    | -      | -            | -                                            | -                |
| B11 | SSC        | SSC (SLC1)                                               | Output | +B11 to -B10 | Vehicle in PARK, engine idling               | -                |
| B12 | ISS        | Input shaft speed sensor signal (NIN)                    | Input  | +B12 to -B13 | Vehicle in PARK, engine idling               | -                |
| B13 | ISS ground | Input shaft speed sensor signal (NIN)                    | -      | -            | -                                            | -                |
| B14 | SSE        | Shift Solenoid E (SSE)                                   | Output | +B14 to -B22 | Vehicle in PARK, engine idling               | -                |
| B16 | SSF ground | Shift Solenoid F (SSF) ground (SLB1G)                    | -      | -            | -                                            | -                |
| B17 | SSD        | Shift Solenoid D (SSD) (SLC2)                            | Output | +B17 to -B18 | Vehicle in PARK, engine idling               | -                |
| B18 | SSD ground | SSD ground (SLC2G)                                       | -      | -            | -                                            | -                |
| B19 | OSS        | Output Shaft Speed (OSS) sensor signal (SP+)             | Input  | +B19 to -B20 | Vehicle speed approximately 20 km/h (12 mph) | -                |
| B20 | OSS ground | OSS sensor ground (SP-)                                  | -      | -            | -                                            | -                |
| B21 | SSF        | SSF (SLB1G)                                              | Output | +B21 to -B16 | Vehicle in PARK, engine idling               | -                |
| B22 | SSE ground | SSE ground (SLC3G)                                       | -      | -            | -                                            | -                |

### PINPOINT TESTS - NON OSC EQUIPPED VEHICLE

#### Special Tools

| Illustration | Tool Name | Tool Number |
|--------------|-----------|-------------|
|              |           |             |

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|                                                                                               |                                                                                                                                       |                         |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <br>ST1137-A | 73 III Automotive Meter                                                                                                               | 105-R0057 or equivalent |
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool |                         |

Anytime an electrical connector or solenoid body is disconnected, inspect the connector for pin condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install a new connector as required.

Prior to carrying out the pinpoint tests, check the following:

- Transmission fluid level
- Transmission fluid condition (burned, metal particles or discolored)
- Engine cooling system
- Other non-related transmission DTCs

### Pinpoint Tests

Refer to **SYSTEM WIRING DIAGRAMS** for schematic and connector information.

#### PINPOINT TEST A: SHIFT SOLENOIDS

**NOTE:** Refer to the Transaxle Vehicle Harness Connector illustration **Transaxle Connector Layouts**.

#### A1 ELECTRONIC DIAGNOSTICS

- Check to make sure the transaxle harness connector is fully seated, pins are fully engaged in the connector and in good condition before proceeding.
- Key in OFF position.
- Connect the diagnostic tool.
- Key in ON position.
- Enter the following diagnostic mode on the diagnostic tool: Retrieve DTCs
- **Are there any transmission DTC faults present?**

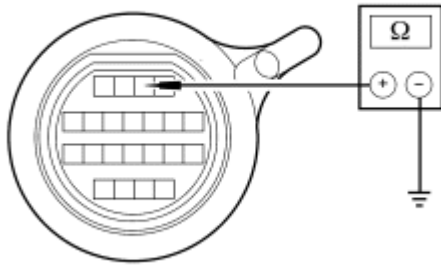
**YES :** For Shift Solenoid A (SSA) and Shift Solenoid B (SSB), go to A2 . For the Pressure Control Solenoid A (PCA), Shift Solenoid C (SSC), Shift Solenoid D (SSD), Shift Solenoid E (SSE), Shift Solenoid F (SSF) and Torque Converter Clutch (TCC), Go to A4 .

**NO :** CLEAR all DTCs. ROAD TEST to verify if concern is still present. Concern could be

intermittent. If concern is still present or reappears, go to the appropriate pinpoint test steps: For shift solenoids SSA and SSB, go to [A2](#) . For shift solenoids PCA, SSC, SSD, SSE, SSF and TCC, Go to A4 .

## A2 CHECK RESISTANCE OF THE ON/OFF SOLENOID CIRCUIT

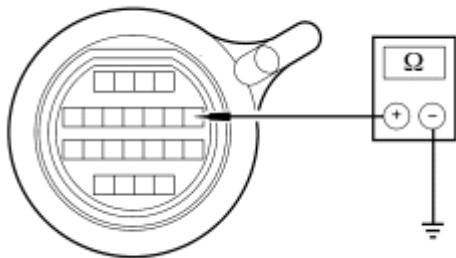
- Key in OFF position.
- Remove the Transmission Control Module (TCM).



N0025043

**Fig. 15: Checking Resistance Of ON/OFF Solenoid Circuit (SSB)**  
Courtesy of FORD MOTOR CO.

- Measure the resistance at the transaxle bulkhead electrical connector between pin 2 and ground for SSB.



N0025044

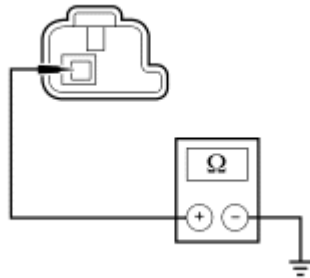
**Fig. 16: Checking Resistance Of ON/OFF Solenoid Circuit (SSA)**  
Courtesy of FORD MOTOR CO.

- Measure the resistance at the transaxle bulkhead electrical connector between pin 5 and ground for SSA.
- **Is the resistance between 11-15 ohms?**  
**YES** : INSTALL a new TCM and REFLASH to the latest level calibration. CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, go to A3 .  
**NO** : Go to A3.

## A3 CHECK RESISTANCE OF THE ON/OFF SOLENOIDS

- Remove the transaxle side cover.

- Remove the wiring connector from the affected solenoid (SSA or SSB).



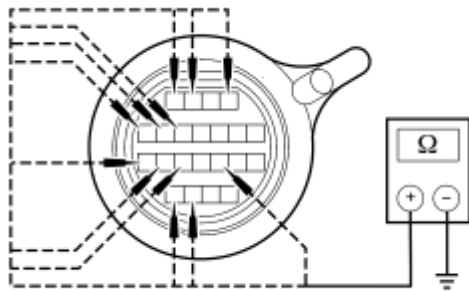
N0025203

**Fig. 17: Checking Resistance Of ON/OFF Solenoids**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between solenoid pin 1 and ground of the affected solenoid.
- **Is each solenoid resistance between 11-15 ohms?**  
YES : INSTALL a new internal wire harness or REPAIR affected circuit.  
NO : INSTALL a new main control.

#### A4 CHECK LINEAR SOLENOID SHORT TO GROUND

- Key in OFF position.
- Remove the TCM.



A0100183

**Fig. 18: Measuring Resistance At Transaxle Bulkhead Electrical Connector Between Pins And Ground**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between the pins in the following chart:

#### TRANSAXLE BULKHEAD ELECTRICAL CONNECTOR

| Pin Number | Circuit Function          |
|------------|---------------------------|
| 1          | Pressure Control Solenoid |

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|    |                                                  |
|----|--------------------------------------------------|
|    | A (PCA)<br>ground                                |
| 3  | PCA<br>signal                                    |
| 4  | Torque<br>Converter<br>Clutch<br>(TCC)<br>ground |
| 9  | TCC<br>signal                                    |
| 10 | Shift<br>Solenoid<br>C (SSC)<br>ground           |
| 11 | SSC<br>signal                                    |
| 14 | Shift<br>Solenoid<br>E (SSE)<br>signal           |
| 16 | Shift<br>Solenoid<br>F (SSF)<br>ground           |
| 17 | Shift<br>Solenoid<br>D (SSD)<br>signal           |
| 18 | SSD<br>ground                                    |
| 21 | SSF<br>signal                                    |
| 22 | SSE<br>ground                                    |

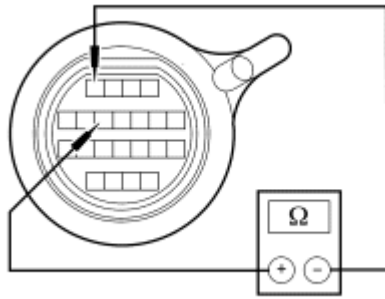
- Is each resistance greater than 10,000 ohms?

**YES** : Go to A5.

**NO** : Go to A6.

### A5 CHECK RESISTANCE OF THE LINEAR SOLENOID(S)

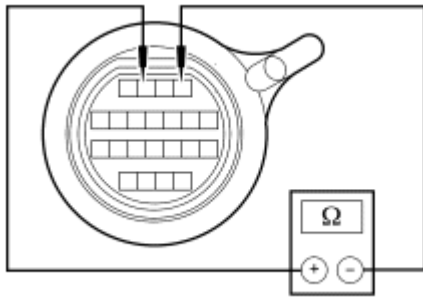
- Inspect both sides of the TCM for damaged or pushed-out pins, corrosion or damaged seals.



A0100177

**Fig. 19: Checking Resistance Of Linear Solenoid (TCC)**  
Courtesy of FORD MOTOR CO.

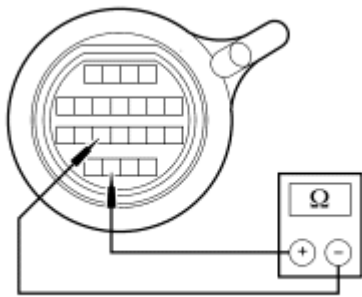
- For the TCC solenoid, measure the resistance between pin 4 and pin 9 at the transaxle.



A0100178

**Fig. 20: Checking Resistance Of Linear Solenoid (PCA)**  
Courtesy of FORD MOTOR CO.

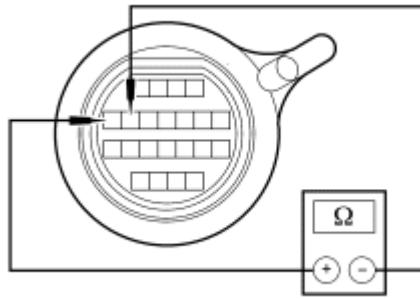
- For the PCA solenoid, measure the resistance between pin 3 and pin 1 at the transaxle.



A0100179

**Fig. 21: Checking Resistance Of Linear Solenoid (SSF)**  
Courtesy of FORD MOTOR CO.

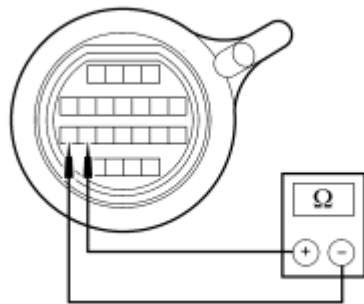
- For the SSF solenoid, measure the resistance between pin 21 and pin 16 at the transaxle.



A0100180

**Fig. 22: Checking Resistance Of Linear Solenoid (SSC)**  
Courtesy of FORD MOTOR CO.

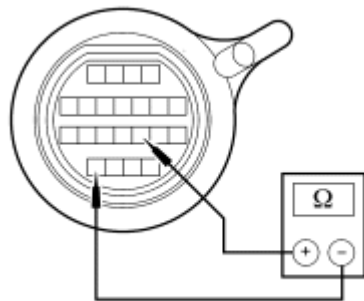
- For the SSC solenoid, measure the resistance between pin 11 and pin 10 at the transaxle.



A0100181

**Fig. 23: Checking Resistance Of Linear Solenoid (SSD)**  
Courtesy of FORD MOTOR CO.

- For the SSD solenoid, measure the resistance between pin 17 and pin 18 at the transaxle.



A0100182

**Fig. 24: Checking Resistance Of Linear Solenoid (SSE)**  
Courtesy of FORD MOTOR CO.

- For the SSE solenoid, measure the resistance between pin 14 and pin 22 at the transaxle.
- **Is the resistance between 5.0 - 5.6 ohms?**

**YES :** INSTALL a new TCM and REFLASH to the latest level calibration. CLEAR all DTCs.  
ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still

present or reappears, go to A6 .

**NO** : Go to A6.

#### **A6 CHECK CONTINUITY OF THE INTERNAL HARNESS**

- Remove the transaxle side cover.
- Remove the wiring connector from the affected solenoid(s) (PCA, SSC, SSD, SSE, SSF and TCC).
- Measure the resistance between the bulkhead connector and the affected solenoid electrical connector.
- **Is each solenoid resistance less than 5 ohms?**

**YES** : INSTALL a new main control.

**NO** : INSTALL a new internal wire harness or repair affected circuit.

#### **PINPOINT TEST B: Transmission Fluid Temperature (TFT) SENSOR**

##### **B1 ELECTRONIC DIAGNOSTICS**

- Connect the diagnostic tool.
- Check to make sure the transaxle harness connector is fully seated, pins are fully engaged in connector and in good condition before proceeding.
- Key in ON position.
- Select Diagnostic Data Link.
- Select Transmission Control Module (TCM).
- Select PID/TFT.
- Enter the following diagnostic mode on the diagnostic tool: PIDs; TFT
- **Does the vehicle enter PID/TFT?**

**YES** : Go to B2.

**NO** : REPEAT procedure to enter PID. If vehicle did not enter PID, REFER to the **Introduction - Gasoline Engines** article.

##### **B2 TEMPERATURE SIGNAL CHECK**

- Key in ON position.
- Select Diagnostic Data Link.
- Select TCM.
- Select PID/TFT.
- Enter the following diagnostic mode on the diagnostic tool: PIDs; TFT
- Monitor the TFT PID. The temperature value should be within -55°C to 175°C (-65°F to 347°F).
- **Is the Transmission Fluid Temperature (TFT) within specified range?**

**YES** : Go to B3.

**NO** : Go to B4.

##### **B3 WARM-UP/COOL-DOWN CYCLE**

- While monitoring the TFT PIDs, carry out the following test: If transmission is cold, run transmission to warm it up. If transmission is warm, allow transmission to cool down.
- **Do the TFT PIDs increase as the transmission is warmed up, decrease as the transmission is**

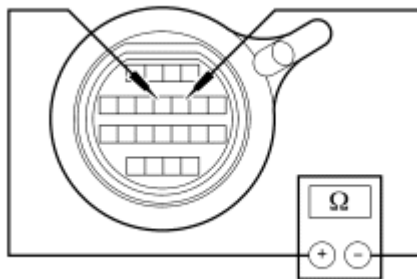
**cooled and does the TFT stay within the specified range?**

**YES** : INSTALL a new TCM and REFLASH to the latest level calibration. CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, go to B4 .

**NO** : Go to B4.

#### B4 SIGNAL RESISTANCE

- Remove the TCM.
- Inspect both sides of the TCM for damaged or pushed-out pins, corrosion or damaged seals.



**Fig. 25: Checking Signal Resistance**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between pins 7 and 8 at the transaxle bulkhead electrical connector. Refer to the following table.

#### TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR RESISTANCE

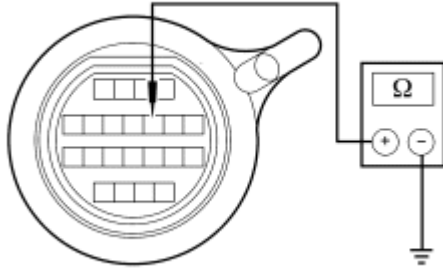
| °C  | °F  | Resistance (Ohms) |
|-----|-----|-------------------|
| 10  | 50  | 6.445             |
| 25  | 77  | 3.5               |
| 110 | 230 | 0.247             |

- Record the resistance.
- **Is the resistance within range?**

**YES** : Go to B5.

**NO** : INSTALL a new internal harness and TFT assembly.

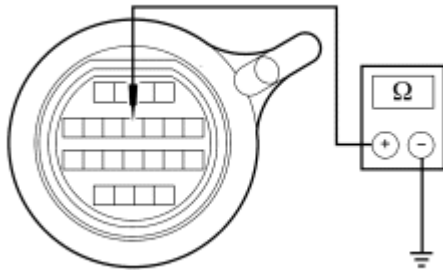
#### B5 SHORT TO GROUND



A0093630

**Fig. 26: Measuring Resistance Between Pin 7 & Ground At Transaxle Bulkhead Electrical Connector**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between pin 7 and ground at the transaxle bulkhead electrical connector.



A0093631

**Fig. 27: Measuring Resistance Between Pin 8 & Ground At Transaxle Bulkhead Electrical Connector**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between pin 8 and ground at the transaxle bulkhead electrical connector.
- Record the resistances.
- **Are the resistances greater than 10,000 ohms?**  
YES : INSTALL a new TCM and REFLASH to the latest level calibration.  
NO : INSTALL a new internal harness and TFT assembly.

#### PINPOINT TEST C: Output Shaft Speed (OSS) SENSORS

##### C1 ELECTRONIC DIAGNOSTICS

- Check to make sure the Transmission Control Module (TCM) connector is fully seated, pins are fully engaged in the connector and in good condition before proceeding.
- Connect the diagnostic tool.
- Key in ON position.
- Monitor the PID for the Output Shaft Speed (OSS) sensor.
- Monitor and record speed.

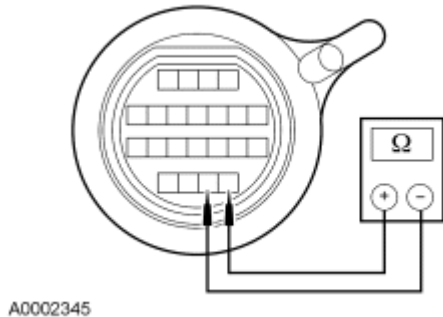
- Does the OSS match the vehicle speed?

**YES :** CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, go to C2 .

**NO :** Go to C2.

## C2 CHECK OSS SENSOR RESISTANCE

- Remove the TCM.



**Fig. 28: Checking OSS Sensor Resistance**  
Courtesy of FORD MOTOR CO.

- Measure the resistance at the transaxle bulkhead electrical connector between pin 19 and 20.

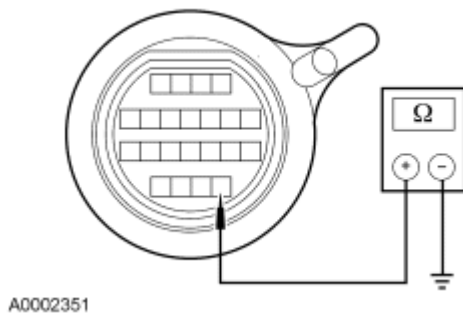
- Is the resistance less than 5 ohms?

**YES :** CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, go to C3 .

**NO :** Go to C4.

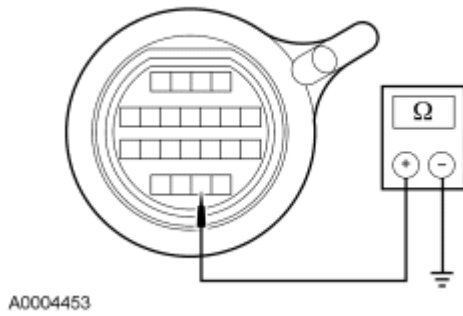
## C3 CHECK OSS SENSOR FOR SHORT TO GROUND

- Remove the TCM.



**Fig. 29: Measuring Resistance At Transaxle Bulkhead Electrical Connector Between Pin 19 & Ground**  
Courtesy of FORD MOTOR CO.

- Measure the resistance at the transaxle bulkhead electrical connector between pin 19 and ground.



**Fig. 30: Measuring Resistance At Transaxle Bulkhead Electrical Connector Between Pin 20 & Ground**

Courtesy of FORD MOTOR CO.

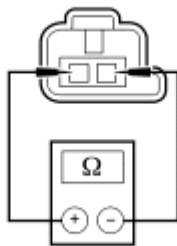
- Measure the resistance at the transaxle bulkhead electrical connector between pin 20 and ground.
- **Is the resistance greater than 10,000 ohms?**

**YES :** INSTALL a new TCM and REFLASH to the latest level calibration. CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, go to C4 .

**NO :** Go to C4.

#### C4 CHECK OSS SENSOR RESISTANCE

- Remove the transaxle side cover.



**Fig. 31: Checking OSS Sensor Resistance**

Courtesy of FORD MOTOR CO.

- Measure the resistance at the speed sensor electrical connector between pin 1 and 2.
- **Is the resistance less than 5 ohms?**

**YES :** INSTALL a new internal harness.

**NO :** INSTALL a new transaxle assembly.

#### PINPOINT TEST D: Turbine Shaft Speed (TSS) SENSOR

##### D1 ELECTRONIC DIAGNOSTICS

- Check to make sure the Transmission Control Module (TCM) connector is fully seated, pins are fully engaged in connector and in good condition before proceeding.

- Connect the diagnostic tool.
- Key in ON position.
- Monitor the PID for the Turbine Shaft Speed (TSS) sensor.
- Monitor and record speed.

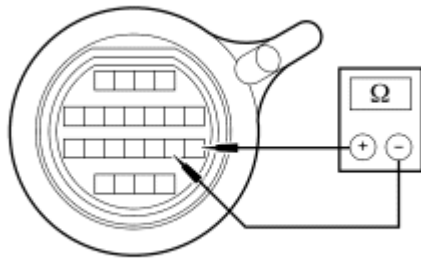
• **Does the TSS match the engine rpm?**

**YES** : CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, go to D2 .

**NO** : Go to D2.

**D2 CHECK TSS SENSOR RESISTANCE**

- Remove the TCM.



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**Fig. 32: Checking TSS Sensor Resistance**  
Courtesy of FORD MOTOR CO.

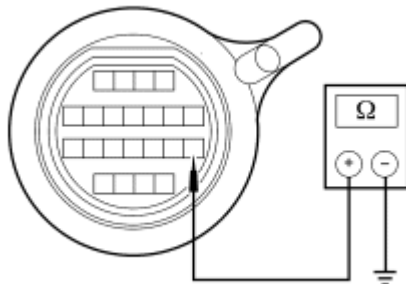
- Measure the resistance at the transaxle bulkhead electrical connector between pin 12 and 13.
- **Is the resistance less than 5 ohms?**

**YES** : CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, go to D3 .

**NO** : Go to D4.

**D3 CHECK TSS SENSOR CIRCUIT FOR SHORT TO GROUND**

- Remove the TCM.

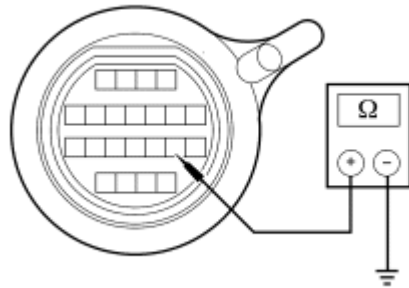


A0100250

**Fig. 33: Measuring Resistance At Transaxle Bulkhead Electrical Connector Between Pin 12 & Ground**

Courtesy of FORD MOTOR CO.

- Measure the resistance at the transaxle bulkhead electrical connector between pin 12 and ground.



A0100251

**Fig. 34: Measuring Resistance At Transaxle Bulkhead Electrical Connector Between Pin 13 & Ground**

Courtesy of FORD MOTOR CO.

- Measure the resistance at the transaxle bulkhead electrical connector between pin 13 and ground.
- **Is the resistance greater than 10,000 ohms?**

**YES :** INSTALL a new TCM and REFLASH to the latest level calibration. CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, go to D4 .

**NO :** Go to D4.

#### **D4 ELECTRONIC DIAGNOSTICS**

- Remove the transaxle side cover.
- Measure the resistance at the TSS sensor electrical connector between pin 1 and 2.
- **Is the resistance less than 5 ohms?**

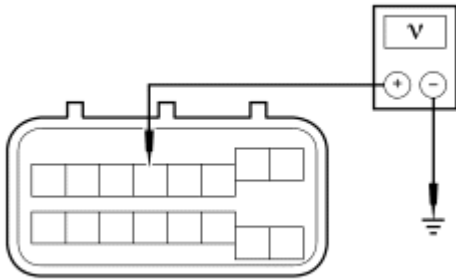
**YES :** CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, INSTALL a new internal harness.

**NO :** The sensor is defective, INSTALL a new TSS sensor.

#### **PINPOINT TEST E: PARK NEUTRAL SIGNAL**

##### **E1 CHECK FOR VOLTAGE ON CIRCUIT CET40 (GN/OG)**

- Disconnect: Transmission Control Module (TCM) C1533
- Key in ON position.
- Selector lever in PARK or NEUTRAL.



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**Fig. 35: Checking For Voltage On Circuit CET40 (GN/OG)**  
Courtesy of FORD MOTOR CO.

- Measure the voltage between C1533-5, circuit CET40 (GN/OG) and chassis ground.

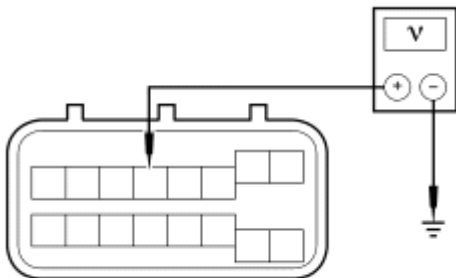
- **Is the voltage between 0-0.8 volt?**

**YES :** Go to E2.

**NO :** Go to E3.

#### **E2 CHECK FOR VOLTAGE ON CIRCUIT CET40 (GN/OG)**

- Selector lever in REVERSE, DRIVE or LOW.



N0066581

**Fig. 36: Checking Voltage On Circuit CET40 (GN/OG)**  
Courtesy of FORD MOTOR CO.

- Measure the voltage between C1533-5, circuit CET40 (GN/OG) and chassis ground.

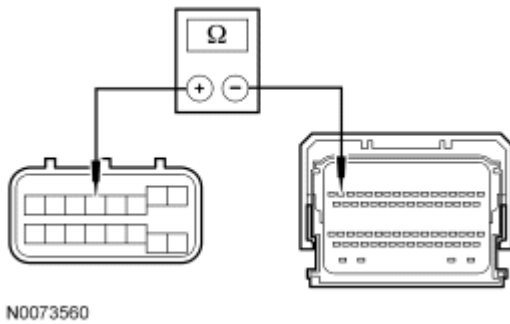
- **Is the voltage greater than 10 volts?**

**YES :** INSTALL a new TCM. After installing the new TCM, VERIFY that the starting system is operating correctly. If not, REFER to **ENGINE COOLING** article to check starting system.

**NO :** Go to E3.

#### **E3 CHECK VEHICLE HARNESS CIRCUIT CET40 (GN/OG) FOR AN OPEN**

- Disconnect: PCM C175B



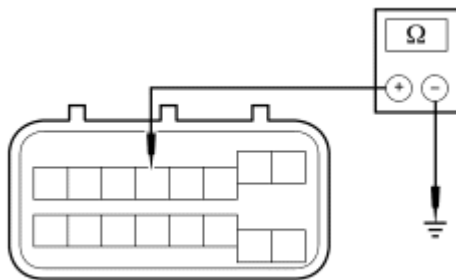
**Fig. 37: Measuring Resistance Between C1533-5, Circuit CET40 (GN/OG) & C175B-16**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between C1533-5, circuit CET40 (GN/OG) and C175B-16.
- **Is the resistance less than 5 ohms?**

**YES** : Go to E4.

**NO** : REPAIR circuit CET40 (GN/OG) for an open.

**E4 CHECK VEHICLE HARNESS CIRCUIT CET40 (GN/OG) FOR A SHORT TO GROUND**



**Fig. 38: Checking Vehicle Harness Circuit CET40 (GN/OG) For A Short To Ground**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between C1533-5, circuit CET40 (GN/OG) and chassis ground.
- **Is the resistance greater than 10,000 ohms?**

**YES** : REPAIR circuit CET40 (GN/OG) for a short to ground.

**NO** : INSTALL a new PCM. After installing the new PCM, VERIFY that the starting system is operating correctly. If not, REFER to **ENGINE COOLING** article to check starting system.

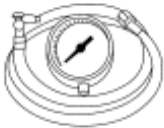
**SPECIAL TESTING PROCEDURES**

**Special Tools**

| Illustration | Tool Name               | Tool Number             |
|--------------|-------------------------|-------------------------|
|              | 73 III Automotive Meter | 105-R0057 or equivalent |

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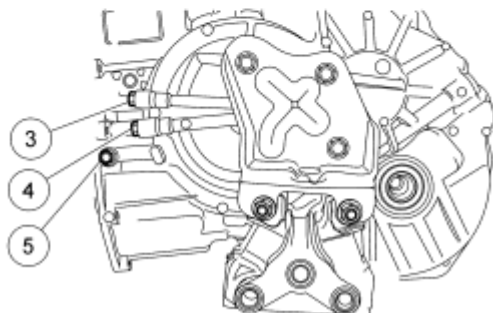
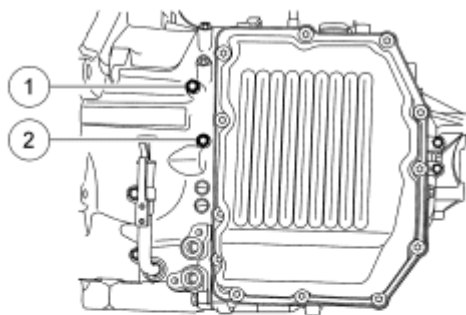
|                                                                                               |                                                                                                                           |                        |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------|
| <br>ST1137-A |                                                                                                                           |                        |
| <br>ST1565-A | Transmission Fluid Pressure Gauge                                                                                         | 307-004 (T57L-77820-A) |
| <br>ST2834-A | Vehicle Communication Module and Integrated Diagnostic System software with appropriate hardware, or equivalent scan tool |                        |

The special tests are designed to aid the technician in diagnosing the hydraulic and mechanical portions of the transaxle.

### Engine Idle Speed Check

Refer to the [Introduction - Gasoline Engines](#) article for diagnosis and testing of the engine idle speed.

### Pressure Test



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**Fig. 39: Pressure Tap Location**  
Courtesy of FORD MOTOR CO.

| Item | Part Number | Description  |
|------|-------------|--------------|
| 1    | -           | Clutch C1    |
| 2    | -           | Clutch C3    |
| 3    | -           | Clutch C2    |
| 4    | -           | Lube circuit |
| 5    | -           | Clutch B2    |

**NOTE:** If the pressure is low at stall, do not continue with the test or further transaxle damage will occur. Do not maintain Wide Open Throttle (WOT) in any transaxle range for more than 5 seconds.

This test verifies that the pressure is within specification.

1. Connect the Transmission Fluid Pressure Gauge to the appropriate pressure tap.
2. Start the engine and check the pressures, see the pressure charts to determine if the pressures are within specification.

### CLUTCH AND BRAKE PRESSURE CHART

| Clutch | Range            | Pressure                   |
|--------|------------------|----------------------------|
| C1     | Drive (1st-4th)  | 196-1,372 kPa (28-199 psi) |
| C2     | Drive (4th-6th)  | 196-1,372 kPa (28-199 psi) |
| C3     | Drive (3rd-5th)  | 196-1,372 kPa (28-199 psi) |
| C3     | Reverse          | 392-1,863 kPa (57-270 psi) |
| B2     | Low manual (1st) | 588-1,372 kPa (85-199 psi) |
| B2     | Reverse          | 392-1,863 kPa (57-         |

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270 psi)

### PRESSURE DIAGNOSTIC CHART

| Test Results                                                         | Possible Source                                                                                                                                                                                                                       |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Values of both DRIVE and REVERSE ranges are lower than the standards | <ul style="list-style-type: none"><li>• Pressure Control Solenoid A (PCA)</li><li>• Primary regulator valve failure</li><li>• Transmission oil pump failure</li><li>• Leak from hydraulic circuit of DRIVE or REVERSE range</li></ul> |
| Only the value of DRIVE range is lower than the standards            | <ul style="list-style-type: none"><li>• DRIVE range hydraulic circuit failure</li><li>• C1 clutch failure</li></ul>                                                                                                                   |
| Only the value of REVERSE range is lower than the standards          | <ul style="list-style-type: none"><li>• REVERSE range hydraulic circuit failure</li><li>• C3 clutch failure</li><li>• B2 brake failure</li></ul>                                                                                      |

3. If the pressure is not within specification, install a new main control valve body.
4. If the pressures are OK, clear all DTCs. Test drive vehicle, code could be intermittent. If DTC returns, install a new valve body.

### Stall Speed Test

**WARNING:** Block all wheels, set the parking brake and firmly apply the service brake to reduce the risk of vehicle movement during this procedure. Failure to follow these instructions may result in serious personal injury.

The Stall Speed Test checks:

- torque converter clutch operation and installation.
- holding ability of the forward clutch.
- reverse clutch (the low-reverse bands).
- planetary one-way clutch.
- engine driveability concerns.

Conduct this test with the engine coolant and transmission fluid at correct levels and at normal operating temperature.

Apply the parking brake firmly for each Stall Speed Test.

1. Find the specified stall rpm for the vehicle, see the Stall Speed Chart. Use a grease pencil to mark the rpm on the dial of a tachometer.

### STALL SPEED

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| Engine       | rpm             |
|--------------|-----------------|
| 3.0L<br>(4V) | 1,878-<br>2,678 |
| 3.5L         | 1,878-<br>2,678 |

2. Connect a scan tool.

**NOTE:** If the rpm recorded by the scan tool exceeds the maximum limits, release the accelerator pedal immediately because clutch or band slippage is indicated.

3. In each of the following ranges REVERSE, DRIVE and LOW, press the accelerator pedal to the floor and hold it just long enough to let the engine get to Wide Open Throttle (WOT). While making this test, do not hold the throttle open for more than 5 seconds at a time.
4. Note the results in each range.
5. After each range, move the selector lever to NEUTRAL and run the engine at 1,000 rpm for about 15 seconds to cool the torque converter before making the next test.
6. Use the stall speed diagnosis chart for corrective actions.

**NOTE:** The stall speed in REVERSE will be lower.

7. If stall speeds were too high, see the Stall Speed Chart. If stall speeds were too low, first check engine idle speed and tune up. If engine is OK, remove torque converter and check torque converter clutch for slippage.

### PRESSURE DIAGNOSTIC CHART

| Test Results                                                         | Possible Source                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Values of both DRIVE and REVERSE ranges are lower than the standards | <ul style="list-style-type: none"><li>• Insufficient engine power</li><li>• Torque converter stator one-way clutch slipping</li></ul>                                                                                                                                              |
| Only the value of DRIVE range is higher than the standards           | <ul style="list-style-type: none"><li>• Low line pressure. Shift control solenoid assembly (SLT) failure, primary regulator valve failure</li><li>• Valve body failure (SLC3 hydraulic pressure system)</li><li>• C1 clutch slipping</li><li>• One-way clutch F1 failure</li></ul> |
| Only the value of REVERSE range is higher than the standards         | <ul style="list-style-type: none"><li>• Low line pressure. Shift control solenoid assembly (SLT) failure, primary regulator valve failure</li><li>• Valve body failure (SLC3 hydraulic pressure system)</li></ul>                                                                  |

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|                                                                       |                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                       | <ul style="list-style-type: none"><li>• C3 clutch failure</li><li>• B2 brake failure</li></ul>                                                                                                                                                           |
| Values of both DRIVE and REVERSE ranges are higher than the standards | <ul style="list-style-type: none"><li>• Low line pressure. Shift control solenoid assembly (SLT) failure, primary regulator valve failure</li><li>• Primary regulator valve failure</li><li>• Oil pump failure</li><li>• Oil strainer clogging</li></ul> |

### LEAKAGE INSPECTION

#### Special Tools

| Illustration                                                                                  | Tool Name               | Tool Number |
|-----------------------------------------------------------------------------------------------|-------------------------|-------------|
| <br>ST1300-A | 100W/12 Volt DC UV Lamp | 164-R0751   |

#### Material

| Item                                                                                   | Specification |
|----------------------------------------------------------------------------------------|---------------|
| Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye<br>164-R3701 (Rotunda)           | -             |
| Motorcraft Premium Automatic Transmission Fluid<br>XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |

**NOTE:** Do not try to stop the fluid leak by increasing the torque beyond specifications. This may cause damage to the case threads.

Use the following chart to inspect and correct any external transmission fluid leaks.

#### EXTERNAL TRANSMISSION FLUID LEAKS

| Description                                           | Action                                                                                                                                                                                            |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Leaks at the transmission fluid pan to case           | Tighten to specification or install a new transmission fluid gasket.                                                                                                                              |
| Transmission fluid filler plug leaks                  | Install a new transmission fluid filler plug.                                                                                                                                                     |
| Transmission fluid cooler or fittings leaking         | Tighten to specification or install new transmission fluid cooler tubes. Refer to <b>TRANSAXLE/TRANSMISSION COOLING</b> article.                                                                  |
| Transmission fluid cooler nut to case fitting leaking | Inspect for damage or missing O-ring seals. Tighten to specification, install new transmission fluid cooler tubes or install new O-rings. Refer to <b>TRANSAXLE/TRANSMISSION COOLING</b> article. |

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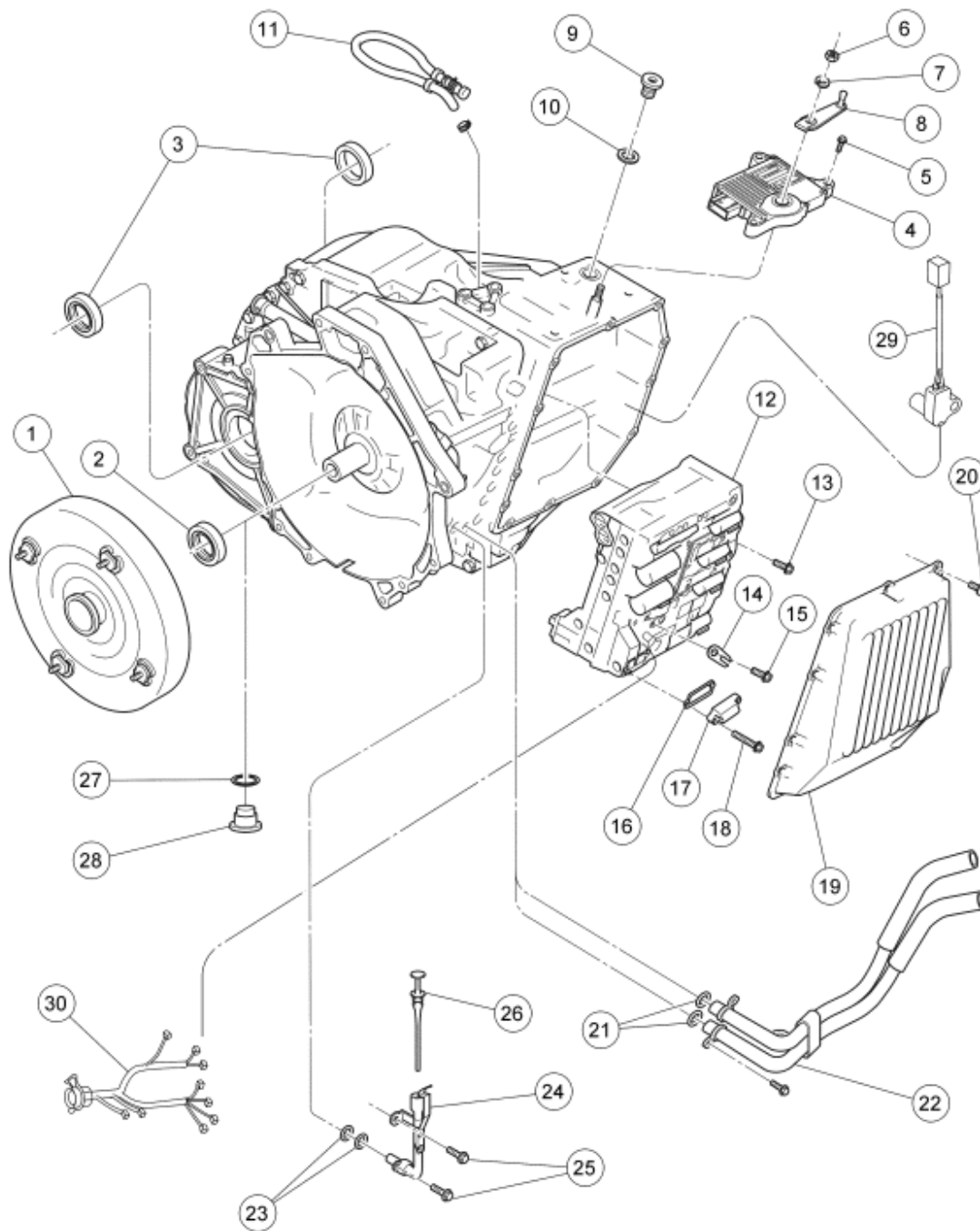
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|                                              |                                                                                                                                                                       |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Leaks at the transmission fluid cooler       | Inspect the transmission fluid cooler for damage, if damaged, install a new transmission fluid cooler. Refer to <b><u>TRANSAXLE/TRANSMISSION COOLING</u></b> article. |
| Leaks at the manual control lever seal       | Install a new manual control lever seal.                                                                                                                              |
| Leaks at the solenoid body harness connector | Install a new solenoid body harness connector O-ring seal, either on the harness end or the solenoid body.                                                            |

### External Sealing

The transaxle has the following parts to prevent external transmission fluid leakage:

- Gaskets
- Lip type seals
- O-ring seals
- Seal rings
- Seal grommets
- Thread sealant



N0037730

**Fig. 40: External Sealing**  
Courtesy of FORD MOTOR CO.

| Item | Part Number | Description               |
|------|-------------|---------------------------|
| 1    | 7902        | Torque converter          |
| 2    | -           | Torque converter hub seal |
| 3    | 1177        | Axle shaft seals          |

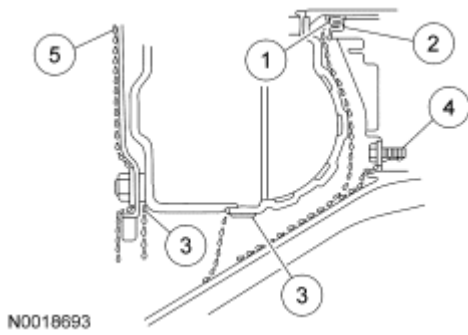
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|    |       |                                                                       |
|----|-------|-----------------------------------------------------------------------|
| 4  | -     | Transmission Control Module (TCM)                                     |
| 5  | -     | TCM bolt                                                              |
| 6  | 7045  | Manual control lever shaft nut                                        |
| 7  | 7C208 | Manual control lever shaft nut washer                                 |
| 8  | 7A256 | Manual control lever                                                  |
| 9  | 7A010 | Transmission fluid fill plug                                          |
| 10 | 7E050 | Transmission fluid fill plug O-ring                                   |
| 11 | -     | Breather hose                                                         |
| 12 | -     | Main control valve body assembly                                      |
| 13 | -     | Main control valve body bolt                                          |
| 14 | -     | Lock plate                                                            |
| 15 | -     | Lock plate bolt                                                       |
| 16 | -     | Suction cover gasket                                                  |
| 17 | -     | Suction cover                                                         |
| 18 | -     | Suction cover bolt                                                    |
| 19 | -     | Main control valve body side cover                                    |
| 20 | -     | Main control valve body side cover bolt                               |
| 21 | 7J227 | Transmission fluid cooler O-rings                                     |
| 22 | 7R081 | Transmission fluid cooler tube                                        |
| 23 | 7E050 | Transmission fluid level indicator tube O-rings                       |
| 24 | 7A228 | Transmission fluid level indicator tube                               |
| 25 | 7A443 | Transmission fluid level indicator tube bolts                         |
| 26 | 7A228 | Transmission fluid level indicator tube                               |
| 27 | 7L101 | Transmission fluid drain plug gasket                                  |
| 28 | 7A010 | Transmission fluid drain plug                                         |
| 29 | 7M101 | Turbine Shaft Speed (TSS) sensor                                      |
| 30 | 7G276 | Internal wire harness and Transmission Fluid Temperature (TFT) sensor |

**Transmission Fluid Leakage in Torque Converter Area**

Leakage at the front of transmission, as evidenced by transmission fluid around the torque converter housing part of the case, may have several sources. By careful observation it is possible, in many instances, to pinpoint the source of a leak before removing the transmission from the vehicle. The paths which the transmission fluid takes to reach the bottom of the torque converter housing are shown in the illustration. The 5 numbers in the illustration correspond with the 5 flow path steps.



**Fig. 41: Identifying Torque Converter Fluid Leakage Area**  
Courtesy of FORD MOTOR CO.

| Leak Path  | Symptom                       | Possible Source                  |
|------------|-------------------------------|----------------------------------|
| 1, 2 and 4 | Leak at front of transmission | Torque converter hub seal        |
| 1, 2 and 4 | Leak at front of transmission | Vent                             |
| 1, 2 and 4 | Leak at front of transmission | Converter hub weld               |
| 1, 2 and 4 | Leak at front of transmission | External pump seal (large)       |
| 1, 2 and 4 | Leak at front of transmission | Pump to case screws              |
| 1, 2 and 4 | Leak at front of transmission | Pump gasket                      |
| 3          | Leak at front of transmission | Torque converter seal weld       |
| 3          | Leak at front of transmission | Torque converter stud            |
| 5          | Leak at front of transmission | Engine oil leak; rear main seal  |
| 5          | Leak at front of transmission | Engine valve cover               |
| 5          | Leak at front of transmission | Oil galley                       |
| 5          | Leak at front of transmission | Pump lip seal                    |
| 5          | Leak at front of transmission | Engine Oil Pressure (EOP) sensor |

#### Leak Check Test With UV Lamp

Dye-Lite® ATF Steering Fluid Leak Detection Dye 164-R3701 or equivalent (specifically formulated for ATF) is used to detect a transmission fluid leak.

1. Add dye to the transmission fluid. Use 30.0 mL (1 oz) of dye solution for every 3.8L (4 qt) of transmission fluid.
2. Start and run the engine until the transaxle reaches its normal operating temperature. Observe the back of the cylinder block and top of the torque converter housing for evidence of fluid leakage. Raise the vehicle on a hoist and run the engine at fast idle, then at engine idle, occasionally shifting to the DRIVE and REVERSE ranges to increase pressure within the transaxle. Observe the front of the flexplate, back of the cylinder block (in as far as possible), and inside the torque converter housing and front of the case. Continue running the engine until fluid leakage is evident and the probable source of leakage can be determined.

#### DIAGNOSIS BY SYMPTOM

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### Special Tools

| Illustration                                                                                  | Tool Name                                                                                                                 | Tool Number             |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <br>ST1137-A | 73 III Automotive Meter                                                                                                   | 105-R0057 or equivalent |
| <br>ST2834-A | Vehicle Communication Module and Integrated Diagnostic System software with appropriate hardware, or equivalent scan tool |                         |

The Diagnosis by Symptom charts give the technician diagnostic information, direction and suggest possible components, using a symptom as a starting point.

The Diagnosis by Symptom charts are divided into 2 categories: Electrical Routines, indicated by 200 series numbers, and Hydraulic/Mechanical Routines, indicated by 300 series numbers. The Electrical Routines list the possible electrical components that could cause or contribute to the symptom described. The Hydraulic/Mechanical Routines list the possible hydraulic or mechanical components that could cause or contribute to the symptom described.

### Diagnosis by Symptom Chart Directions

1. Using the Symptom Index, select the concern/symptom that best describes the condition.
2. See the routine indicated in the diagnosis by Symptom Index.
3. Always begin diagnosis of a symptom with:
  1. Preliminary inspections.
  2. Verifications of condition.
  3. Checking the fluid levels.
  4. Carry out other test procedures as directed.

**NOTE:** Not all concerns and conditions with electrical components will set a DTC. Be aware that the components listed may still be the cause. Verify correct function of these components prior to proceeding to the routine listed.

4. Begin with the routine indicated. Follow the reference or action required statements. Always carry out the on-board diagnostic tests as required. Never skip steps. Repair as required. These components are listed in the removal sequence and by the most probable cause. All components listed must be inspected to make sure of correct repair.

### DIAGNOSIS BY SYMPTOM INDEX

| Title               | Routines |
|---------------------|----------|
| Engagement Concerns |          |

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|                                                   |     |
|---------------------------------------------------|-----|
| No forward and/or No reverse                      | 207 |
| Harsh                                             | 208 |
| Soft                                              | 209 |
| <b>Torque Converter Clutch Operation Concerns</b> |     |
| Does not apply                                    | 240 |
| Cycling/shudder/chatters                          | 242 |
| <b>NVH</b>                                        |     |
| Noise/vibration - forward or reverse              | 254 |
| <b>Other Concerns</b>                             |     |
| Transmission fluid level                          | 286 |
| Transmission fluid condition                      | 287 |
| Transmission control module software              | 288 |

**Diagnostic Routines****ENGAGEMENT CONCERNS: NO FORWARD AND/OR NO REVERSE**

| Possible Component                                   | Reference/Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>207 - ROUTINE</b>                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>No Forward, No Reverse, No Forward or Reverse</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Selector lever linkage damaged or out of position    | Using a scan tool, check selector lever position. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.                                                                                                                                                                                                                                                                                                                                                                                                          |
| Incorrect neutral switch position                    | Carry out neutral position learning. Refer to <b><u>Neutral Position Learning</u></b> .<br><br>Disconnect the Transmission Control Module (TCM) electrical connector. If concern still exists, this indicates an internal mechanical problem. Connect the TCM and carry out pressure checks.<br><br>If concern is resolved by disconnecting the TCM, this indicates an electrical concern. Install a new TCM. Refer to <b><u>Transmission Control Module (TCM)</u></b> . Check wiring harness (external and internal) valve body connections. |
| Halfshafts broken                                    | Inspect for damaged or broken halfshafts. Refer to <b><u>FRONT DRIVE HALFSHAFTS</u></b> article.                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**ENGAGEMENT CONCERNS: HARSH**

| Possible Component                                                  | Reference/Action                                                                                                                                    |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>208 - ROUTINE</b>                                                |                                                                                                                                                     |
| <b>Harsh Engagements</b>                                            |                                                                                                                                                     |
| Initial learn values wrong                                          | Carry out Transmission Control Module (TCM) initial learning procedure. Refer to <b><u>Transmission Control Module (TCM) Initial Learning</u></b> . |
| Damaged internal transaxle components causing high or low pressures | Carry out pressure test. Refer to <b><u>Special Testing Procedures</u></b> .                                                                        |

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Damaged or malfunctioning solenoids

Carry out pinpoint test. Refer to **Pinpoint Tests - Non OSC Equipped Vehicle.**

### ENGAGEMENT CONCERNS: SOFT

| Possible Component                                                  | Reference/Action                                                                                                                                   |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>209 - ROUTINE</b>                                                |                                                                                                                                                    |
| <b>Soft Engagements</b>                                             |                                                                                                                                                    |
| Initial learn values wrong                                          | Carry out Transmission Control Module (TCM) initial learning procedure. Refer to <b><u>Transmission Control Module (TCM) Initial Learning.</u></b> |
| Damaged internal transaxle components causing high or low pressures | Carry out pressure test. Refer to <b><u>Special Testing Procedures.</u></b>                                                                        |
| Damaged or malfunctioning solenoids                                 | Carry out pinpoint test. Refer to <b><u>Pinpoint Tests - Non OSC Equipped Vehicle.</u></b>                                                         |

### TORQUE CONVERTER CLUTCH OPERATIONS CONCERNS: DOES NOT APPLY

| Possible Component                         | Reference/Action                                                                                                                                                                  |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>240 - ROUTINE</b>                       |                                                                                                                                                                                   |
| <b>Torque Converter Does Not Apply</b>     |                                                                                                                                                                                   |
| Damaged or malfunctioning solenoid         | Carry out pinpoint test. Refer to <b><u>Pinpoint Tests - Non OSC Equipped Vehicle.</u></b> Install a new main control valve body. Refer to <b><u>Main Control Valve Body.</u></b> |
| Damaged or disconnected wire harness       | Inspect wire harness. Check connections to the Torque Converter Clutch (TCC) solenoid.                                                                                            |
| Damaged or malfunctioning torque converter | Install a new torque converter. Refer to <b><u>Torque Converter.</u></b>                                                                                                          |

### TORQUE CONVERTER CLUTCH OPERATIONS CONCERNS: CYCLING/SHUTTER/CHATTERS

| Possible Component                                               | Reference/Action                                                                       |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>242 - ROUTINE</b>                                             |                                                                                        |
| <b>Torque Converter Cycling, Shudders or Chatters</b>            |                                                                                        |
| Damaged or malfunctioning Torque Converter Clutch (TCC) solenoid | Install a new main control valve body. Refer to <b><u>Main Control Valve Body.</u></b> |
| Damaged or disconnected wire harness                             | Inspect wire harness. Check connections to the TCC solenoid.                           |
| Damaged or malfunctioning torque converter                       | Install a new torque converter. Refer to <b><u>Torque Converter.</u></b>               |

**NOTE:** NVH symptoms should be identified using the diagnostic tools that are available. For a list of these tools, an explanation of their uses and a glossary of common terms, refer to **NOISE, VIBRATION AND HARSHNESS** article. Since it is possible any one of multiple systems may be the cause of a symptom, it may be necessary to use a process of elimination type of diagnostic approach to

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**pinpoint the responsible system. If this is not the causal system for the symptom, refer back to NOISE, VIBRATION AND HARSHNESS article for the next likely system and continue diagnosis.**

### OTHER CONCERNS: NOISE/VIBRATION - FORWARD OR REVERSE

| Possible Component                                                                                               | Reference/Action                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>254 - ROUTINE</b>                                                                                             |                                                                                                                                                                                                                                                                       |
| <b>Powertrain Control System</b>                                                                                 |                                                                                                                                                                                                                                                                       |
| Transmission Control Module (TCM) , vehicle wiring harnesses, Shift Solenoid A (SSA) and Shift Solenoid B (SSB). | Carry out on-board diagnostic tests. Refer to the <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis and testing of the TCM. Go to <b><u>Pinpoint Test A</u></b> . Repair as required. Clear the DTCs, road test and rerun on-board diagnostic test. |
| <b>Incorrect Transmission Fluid Level</b>                                                                        |                                                                                                                                                                                                                                                                       |
| Transmission fluid level low/overfilled                                                                          | Check the transmission fluid level. Adjust the transmission fluid level as necessary. Refer to <b><u>Preliminary Inspection</u></b> .                                                                                                                                 |
| <b>Torque Converter</b>                                                                                          |                                                                                                                                                                                                                                                                       |
| Worn or damaged torque converter                                                                                 | Refer to <b><u>Torque Converter Diagnosis</u></b> .                                                                                                                                                                                                                   |
| <b>Transaxle Support Insulator</b>                                                                               |                                                                                                                                                                                                                                                                       |
| Worn or damaged transaxle support insulator                                                                      | Inspect the transaxle support insulator for damage. Install new as necessary. Refer to <b><u>Transaxle Support Insulator</u></b> .                                                                                                                                    |

### OTHER CONCERNS: TRANSMISSION FLUID LEVEL

| Possible Component                      | Reference/Action                                                                                                                                                                                  |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>286 - ROUTINE</b>                    |                                                                                                                                                                                                   |
| <b>Low Transmission Fluid Level</b>     |                                                                                                                                                                                                   |
| Axle shaft seal leaking                 | Install new axle shaft seals. Refer to <b><u>Differential Seals - LH, Differential Seals - RH, Front Wheel Drive (FWD)</u></b> and <b><u>Differential Seals - RH, All Wheel Drive (AWD)</u></b> . |
| Transmission fluid pan leaking          | Reseal the transmission fluid pan.                                                                                                                                                                |
| Torque converter hub seal leaking       | Install a new torque converter hub seal. Refer to <b><u>Torque Converter Hub Seal</u></b> .                                                                                                       |
| Transmission fluid cooler tubes leaking | Install new transmission fluid cooler tube O-rings.                                                                                                                                               |
| Manual control lever seal leaking       | Install a new manual control lever seal. Refer to <b><u>Manual Control Lever Shaft and Seal</u></b> .                                                                                             |
| Transmission fluid drain plug leaking   | Install a new transmission fluid drain plug seal.                                                                                                                                                 |

### OTHER CONCERNS: TRANSMISSION FLUID CONDITION

| Possible Component                              | Reference/Action                                                    |
|-------------------------------------------------|---------------------------------------------------------------------|
| <b>287 - ROUTINE</b>                            |                                                                     |
| <b>Transmission Fluid Burnt or Contaminated</b> |                                                                     |
| Internal components damaged (clutch plate       | Install a new transaxle. Refer to <b><u>Transaxle - 3.0L</u></b> or |

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material)

Transaxle - 3.5L.

### OTHER CONCERNS: TRANSMISSION CONTROL MODULE (TCM) SOFTWARE

| Possible Component                                              | Reference/Action                           |
|-----------------------------------------------------------------|--------------------------------------------|
| <b>288 - ROUTINE</b>                                            |                                            |
| <b>Shifting and Driveability Concerns</b>                       |                                            |
| Transmission Control Module (TCM) not at current software level | Reflash the TCM to current software level. |

## GENERAL PROCEDURES

### TRANSMISSION FLUID COOLER - BACKFLUSHING AND CLEANING

#### Material

| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |

**NOTE:** **MERCON®, MERCON® V, MERCON® SP, Motorcraft Premium Automatic Transmission Fluid and Motorcraft Continuously Variable Chain Type Transmission Fluid are not interchangeable transmission fluids. The use of any transmission fluid other than what is recommended for this transaxle will cause transaxle damage. Refer to the transmission fluid specification for the correct transmission fluid.**

1. Carry out backflushing with a suitable torque converter/fluid cooler cleaner. Test equipment to make sure that a vigorous transmission fluid flow is present before proceeding. Install a new system transmission fluid filter if flow is weak or contaminated.
2. To aid in attaching the cleaner to the transmission fluid cooler tube, connect 2 additional rubber hoses to the transaxle end of the transmission fluid cooler tube as follows:
  1. Connect the cleaner tank pressure tube to the transmission fluid cooler return tube.
  2. Connect a tank return hose to the transmission fluid cooler pressure tube. Place the outlet end of this hose in the transmission fluid tank reservoir.
3. Turn on the pump and allow the transmission fluid to circulate a minimum of 5 minutes (cycling switch on and off will help dislodge contaminants in cooler system).
4. Switch off the pump and disconnect the transmission fluid pressure hose from the transmission fluid cooler return tube.
5. Use compressed air to blow out the transmission fluid cooler and tubes (blow air into the transmission fluid cooler return tube) until all transmission fluid is removed.
6. Remove the rubber return hose from the remaining transmission fluid cooler tube.

### TORQUE CONVERTER

1. A new or remanufactured torque converter must be installed if one or more of the following statements

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are true:

- A torque converter malfunction has been determined based on complete diagnostic procedures.
- Converter stud(s), impeller hub or bushing are damaged.
- Discoloration of the torque converter (due to overheating).
- The torque converter is found to be out of specification when carrying out one of the following torque converter checks:
  - One-Way Clutch Check
  - End Play Check
  - Stator to Turbine Interference Check
  - Stator to Impeller Interference Check
  - Torque Converter Leak Check
- Evidence of transmission assembly or fluid contamination due to the following transmission or converter failure modes:
  - Major Metallic Failure
  - Multiple Clutches or Clutch Plate Failures
  - Sufficient Component Wear which results in Metallic Contamination

### TORQUE CONVERTER CONTAMINATION INSPECTION

#### Material

| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |

1. If a new or remanufactured torque converter is not being installed, the following procedures must be carried out:
  - The torque converter must be thoroughly cleaned.
  - Torque converters with drain plugs can be cleaned by using a suitable torque converter/fluid cooler cleaner.
  - Torque converters without drain plugs can be cleaned by hand. Partially fill the torque converter using only recommended transmission fluid for the applicable transmission. Hand agitate the torque converter and then thoroughly drain the transmission fluid. Refill the torque converter with new transmission fluid specified for transmission and reinstall.

### TRANSMISSION FLUID DRAIN AND REFILL

#### Special Tools

| Illustration | Tool Name                                                                                                                   | Tool Number |
|--------------|-----------------------------------------------------------------------------------------------------------------------------|-------------|
|              | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent |             |

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ST2834-A

scan tool

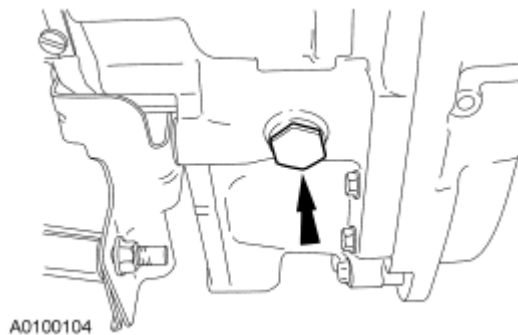
### Material

| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |

**NOTE:** **MERCON®, MERCON® V, MERCON® SP, Motorcraft Premium Automatic Transmission Fluid and Motorcraft Continuously Variable Chain Type Transmission Fluid are not interchangeable transmission fluids. The use of any transmission fluid other than what is recommended for this transaxle will cause transaxle damage.**

### Draining

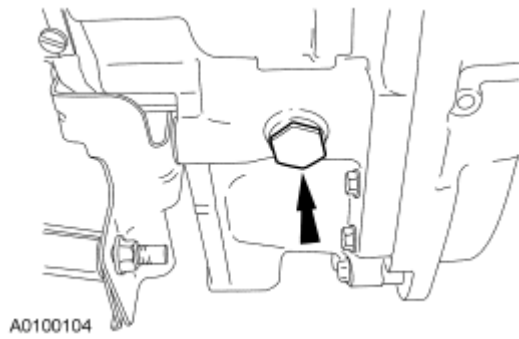
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



**Fig. 42: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

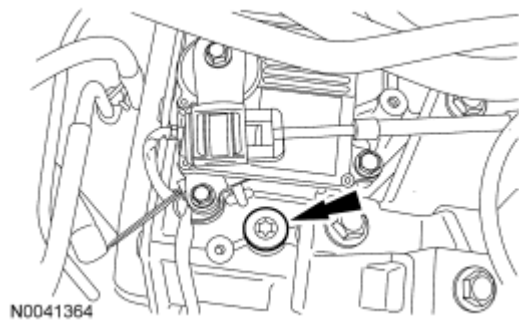
### Refill

3. Install the transmission fluid drain plug.
  - Tighten to 47 Nm (35 lb-ft).



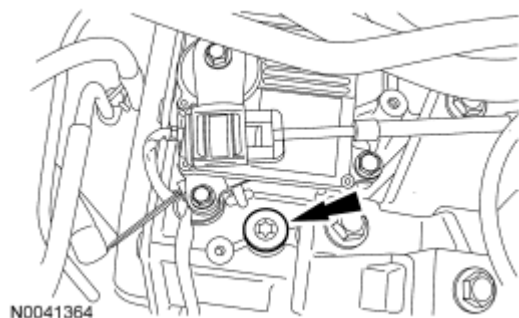
**Fig. 43: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

4. Remove the transmission fluid fill plug.



**Fig. 44: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

5. Fill the transaxle with approximately 4.7L (5 qt) of clean transmission fluid.
6. Install the transmission fluid fill plug.
  - Tighten to 39 Nm (29 lb-ft).



**Fig. 45: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

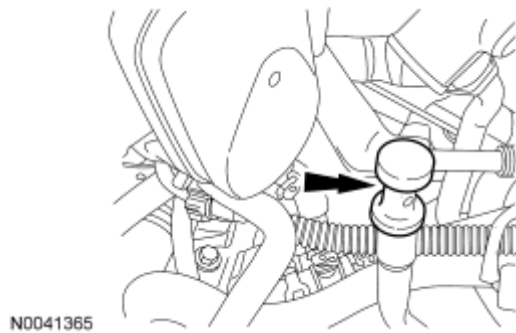
7. With the selector lever in PARK, the vehicle should be on a level surface, the engine at idle (680-780 rpm), foot pressed on the brake, move the selector lever through each gear and allow engagement of each

gear. Place the selector lever back in the PARK position.

8. Wipe the transmission fluid level indicator cap and remove the transmission fluid level indicator.
9. Wipe the transmission fluid level indicator with a clean cloth.

**NOTE:** In order to get an accurate transmission fluid level reading, the vehicle should be on a level surface. Idle the engine to reach the normal operating temperature. Using the scan tool, verify that the transaxle is at normal operating temperature 60°C-70°C (140°F-158°F), prior to adjusting the transmission fluid level.

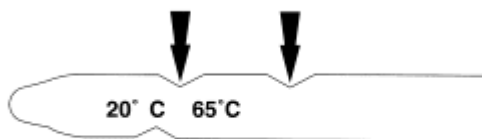
10. If transmission fluid needs to be added, add transmission fluid in 0.25L (1/2 pt) increments through the transmission fluid fill plug located on the top of the transaxle near the transmission fluid level indicator. Do not overfill the transmission fluid. Install the transmission fluid level indicator back in the transmission fluid filler tube until it is fully seated, then remove the transmission fluid lever indicator. The transmission fluid level should be at the uppermost mark on the transmission fluid level indicator. Only fill to the uppermost mark on the transmission fluid indicator. Do not overfill. Damage to the transaxle will occur.



**Fig. 46: Locating Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid at normal operating temperature of 60°C-70°C (140°F-158°F) is between the top 2 marks on the fluid level indicator.

11. Fill the transaxle to the correct transmission fluid level.

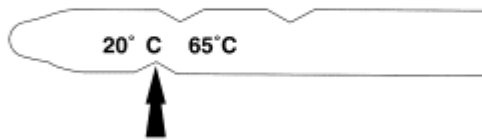


**Fig. 47: Locating Temperature Marks On Fluid Level Indicator**

Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at cool operating temperature of 15°C-25°C (59°F-77°F), is at the bottom mark on the transmission fluid level indicator.

12. If the Transmission Fluid Temperature (TFT) is low, fill the transaxle with transmission fluid to the cold range on the transmission fluid level indicator. Recheck the transmission fluid level when the transaxle has reached the normal operating temperature.



N0044163

**Fig. 48: Locating Bottom Mark On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

## NEUTRAL POSITION LEARNING

### Special Tools

| Illustration                                                                                    | Tool Name                                                                 | Tool Number                                                 |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------|
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) | software with appropriate hardware, or equivalent scan tool |

**NOTE:** When installing a new Transmission Control Module (TCM), the initialized learned values will need to be carried out.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Install the scan tool.
3. Turn the ignition ON.
4. The scan tool should indicate NEUTRAL.
  - If the scan tool does not indicate NEUTRAL, carry out TCM adjustment. For additional information, refer to **Transmission Control Module (TCM)**.
5. If NEUTRAL is indicated on the scan tool, move the selector lever to PARK and turn the ignition OFF.

6. Turn the ignition ON and move the selector lever from PARK to DRIVE.
  - The scan tool should indicate each PRNDL position.
7. If the diagnostic display indicates each PRNDL position, check for any DTCs.
8. If the diagnostic display does not indicate each PRNDL position, carry out **Transmission Control Module (TCM) Initial Learning**.

## TRANSMISSION CONTROL MODULE (TCM) INITIAL LEARNING

### Special Tools

| Illustration                                                                                 | Tool Name                                                                 | Tool Number                                                 |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------|
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) | software with appropriate hardware, or equivalent scan tool |

**NOTE:** Do not raise the Transmission Fluid Temperature (TFT) by stalling the engine, internal transaxle damage will occur.

**NOTE:** Clear all DTCs first.

**NOTE:** When installing a new transmission, Transmission Control Module (TCM) or reflashing the TCM, the initialized learned values will need to be carried out.

**NOTE:** This procedure cannot be carried out if the transmission fluid is not within the correct temperature specification.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Install the scan tool.
3. Monitor and note the engagement and shift harshness on the scan tool.
4. With the engine idling, monitor the Transmission Fluid Temperature (TFT). The TFT should be between 66°C-110°C (151°F-230°F).
5. With your foot on the brake, move the selector lever to NEUTRAL and hold for 3 seconds. Then move the selector lever to DRIVE and hold for 3 seconds. Carry this out 5 times. Then move the selector lever to PARK.
6. With your foot on the brake, move the selector lever to NEUTRAL and hold for 3 seconds. Then move the selector lever to REVERSE and hold for 3 seconds. Carry this out 5 times. Then move the selector lever to PARK.
7. Drive the vehicle and monitor the scan tool.
8. Drive the vehicle with the throttle opening between 25-30%. Drive until the vehicle reaches 6th gear, not to exceed 80 km/h (50 mph). Then release the accelerator and coast to a stop within 60 seconds. Carry

this out 10 times.

9. The engagement and shift harshness have decreased.

## IN-VEHICLE SERVICING

### MAIN CONTROL VALVE BODY

#### Special Tools

| Illustration                                                                                  | Tool Name                                                                                                                             | Tool Number |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool |             |

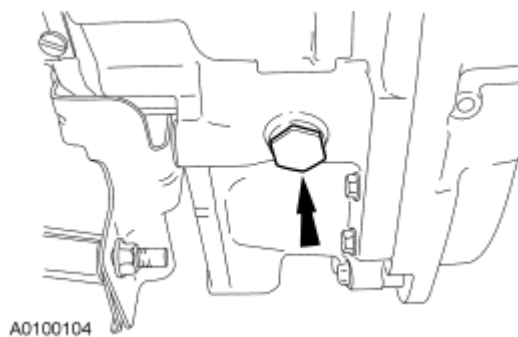
#### Material

| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |
| Ultra Silicone Sealant TA-29                                                        | -             |

#### REMOVAL

**NOTE:** **MERCON®**, **MERCON® V**, **MERCON® SP**, **Motorcraft Premium Automatic Transmission Fluid** and **Motorcraft Continuously Variable Chain Type Transmission Fluid** are not interchangeable transmission fluids. The use of any transmission fluid other than what is recommended for this transaxle will cause transaxle damage.

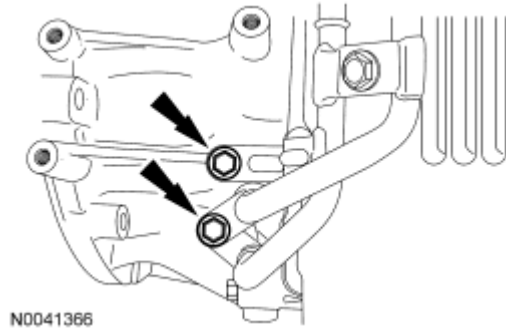
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



**Fig. 49: Locating Transmission Fluid Drain Plug**

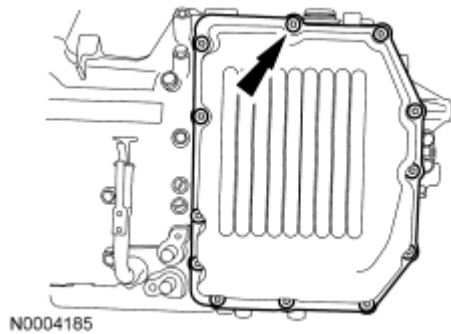
Courtesy of FORD MOTOR CO.

3. Disconnect the transmission fluid cooler tubes at the transaxle and position the tubes aside.



**Fig. 50: Locating Transmission Fluid Cooler Tube Bolts**  
Courtesy of FORD MOTOR CO.

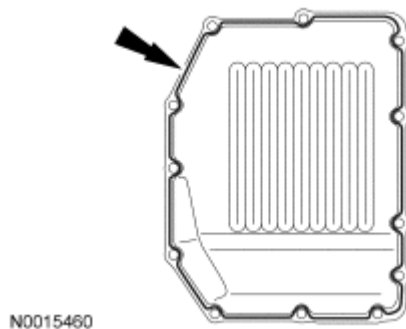
4. Remove and discard the transmission fluid pan bolts and remove the pan.



**Fig. 51: Locating Transmission Fluid Pan Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** When removing the sealer, use care not to damage the sealing surfaces.

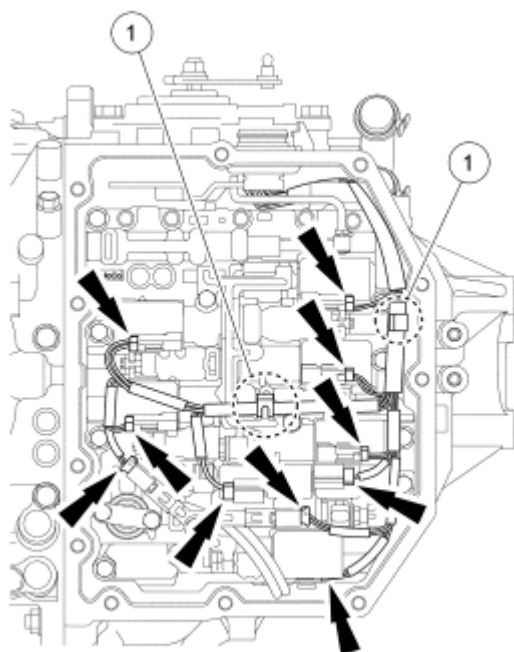
5. Remove the sealer off the fluid pan.



**Fig. 52: Locating Fluid Pan Sealer**

Courtesy of FORD MOTOR CO.

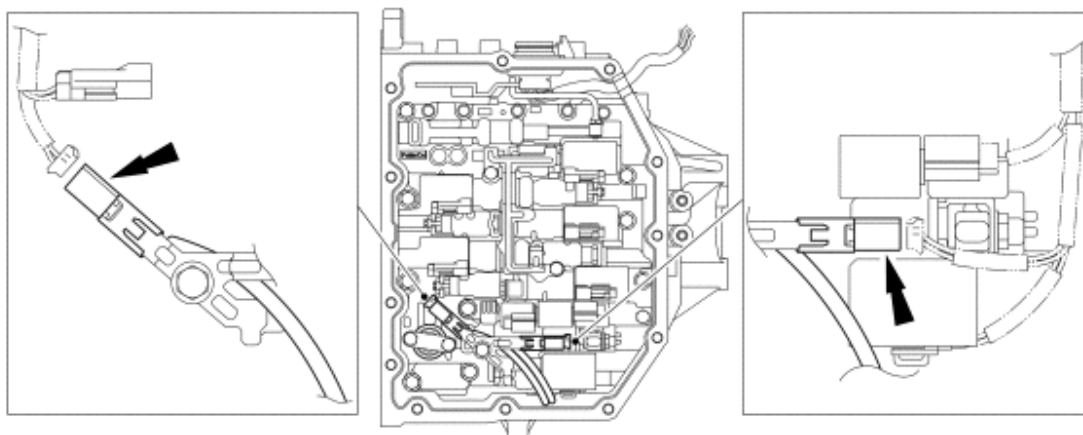
6. Disconnect the wire harness from the solenoids.
  1. Remove the wire harness from the clamps.
  2. Disconnect the 8 solenoid connectors and the 2 speed sensor connectors.



N0015461

**Fig. 53: Locating Solenoid Connectors & Speed Sensor Connectors**  
Courtesy of FORD MOTOR CO.

7. Remove the 2 speed sensor wires from the solenoid clamp.

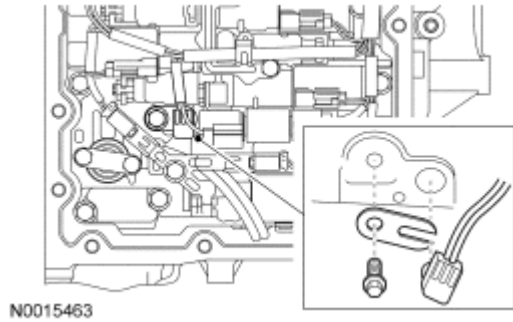


N0015462

**Fig. 54: Locating Speed Sensor Wires**

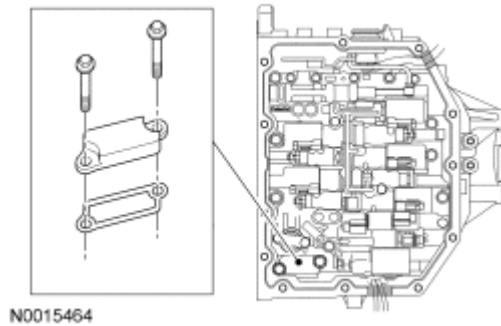
Courtesy of FORD MOTOR CO.

8. Remove the bolt and the lock plate and pull out the Transmission Fluid Temperature (TFT) sensor.



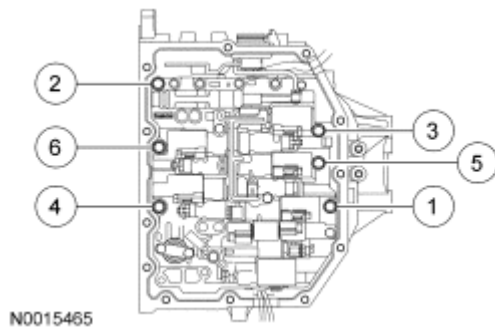
**Fig. 55: Identifying Transmission Fluid Temperature Sensor, Bolt & Lock Plate**  
Courtesy of FORD MOTOR CO.

9. Remove the 2 bolts, suction cover and gasket.



**Fig. 56: Identifying Suction Cover, Gasket & Bolts**  
Courtesy of FORD MOTOR CO.

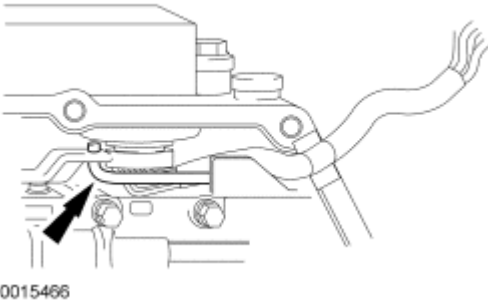
10. Remove the 6 main control valve body bolts in the sequence shown.



**Fig. 57: Identifying Main Control Valve Body Bolts Sequence**  
Courtesy of FORD MOTOR CO.

**NOTE:** Be careful when removing the main control valve body, the manual control lever will fall out of its bore. Also, once all the bolts are removed, the main control valve body will fall out of the transaxle.

11. Remove the main control valve body.

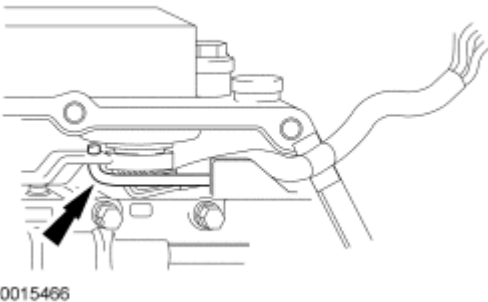


**Fig. 58: Locating Manual Control Lever**  
Courtesy of FORD MOTOR CO.

#### INSTALLATION

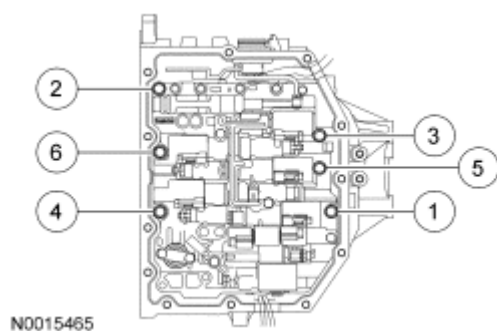
**NOTE:** When installing the main control valve body, place the wire harness in the open space of the separate plate, being careful not to pinch the harness. Damage to the harness will occur.

1. Connect the manual valve link and position the main control valve body in place.



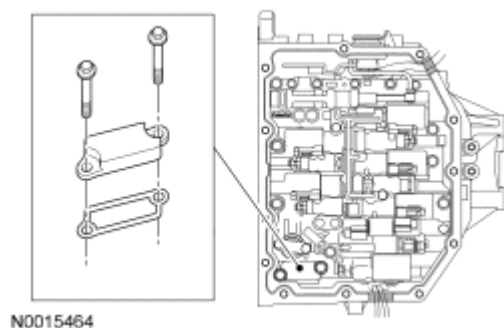
**Fig. 59: Locating Manual Control Lever**  
Courtesy of FORD MOTOR CO.

2. Loosely install the 6 main control valve body bolts in the sequence shown.



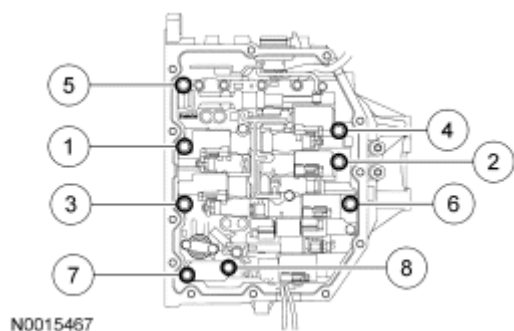
**Fig. 60: Identifying Main Control Valve Body Bolts Sequence**  
Courtesy of FORD MOTOR CO.

3. Install the suction cover gasket, cover and loosely install the 2 bolts.



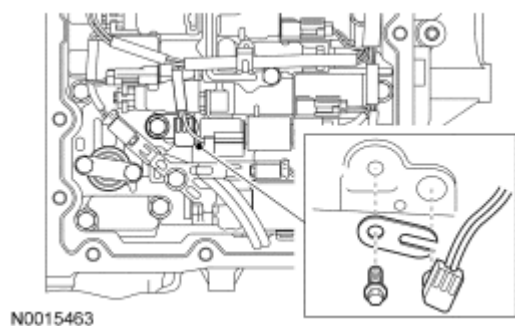
**Fig. 61: Identifying Suction Cover, Gasket & Bolts**  
Courtesy of FORD MOTOR CO.

4. Tighten the 8 bolts to 10 Nm (89 lb-in) in the sequence shown.



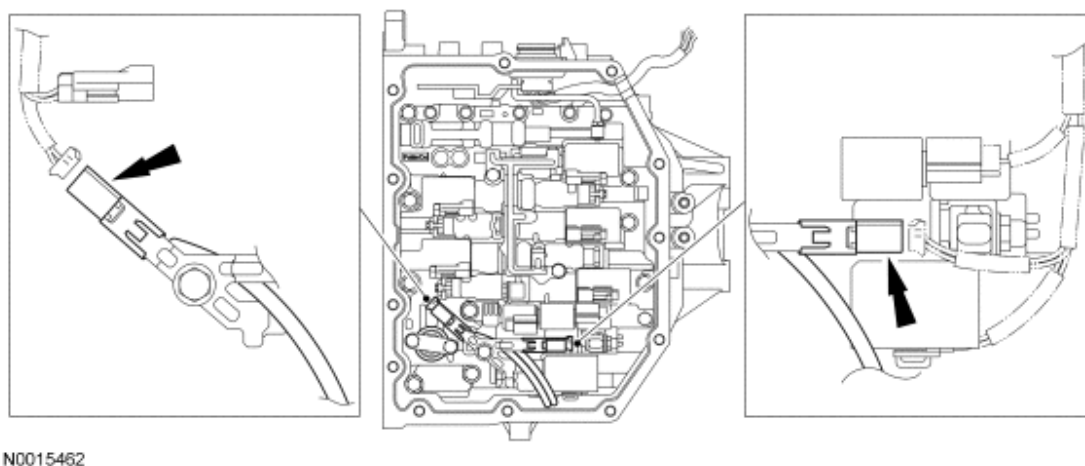
**Fig. 62: Identifying Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

5. Lubricate the O-ring and install the TFT sensor.
  - Tighten to 10 Nm (89 lb-in).



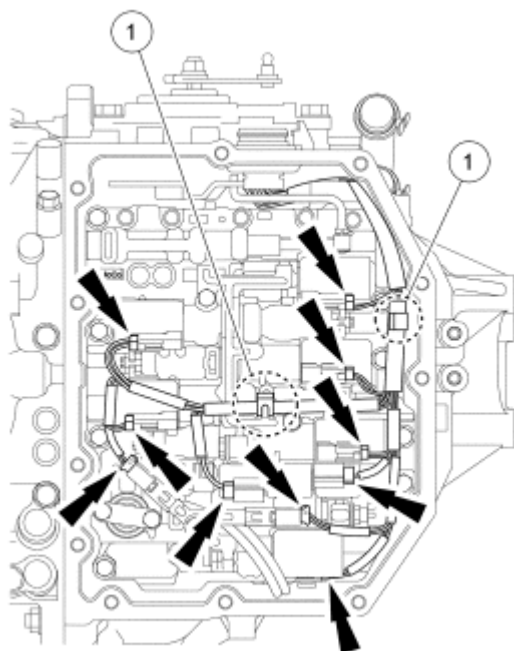
**Fig. 63: Identifying Transmission Fluid Temperature Sensor, Bolt & Lock Plate**  
Courtesy of FORD MOTOR CO.

6. Connect the 2 speed sensor wires.



**Fig. 64: Locating Speed Sensor Wires**  
Courtesy of FORD MOTOR CO.

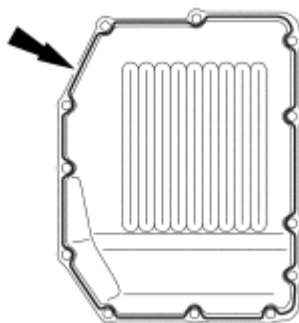
7. Connect the wire harness to the solenoids.
  1. Install the wire harness into the clamps.
  2. Connect the 8 solenoid connectors and the 2 speed sensor connectors.



N0015461

**Fig. 65: Locating Solenoid Connectors & Speed Sensor Connectors**  
Courtesy of FORD MOTOR CO.

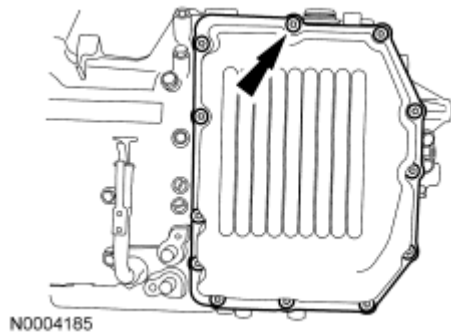
8. Install a bead of sealer to the fluid pan.



N0015460

**Fig. 66: Locating Fluid Pan Sealer**  
Courtesy of FORD MOTOR CO.

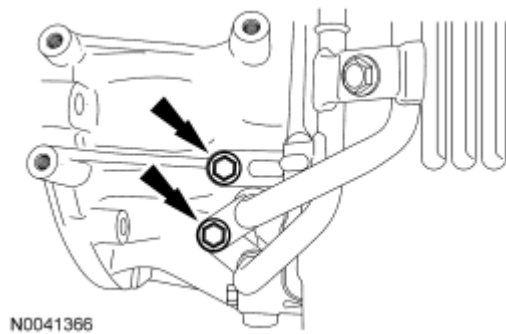
9. Using new pan bolts, install the fluid pan.
  - Tighten to 13 Nm (115 lb-in).



**Fig. 67: Locating Transmission Fluid Pan Bolts**  
Courtesy of FORD MOTOR CO.

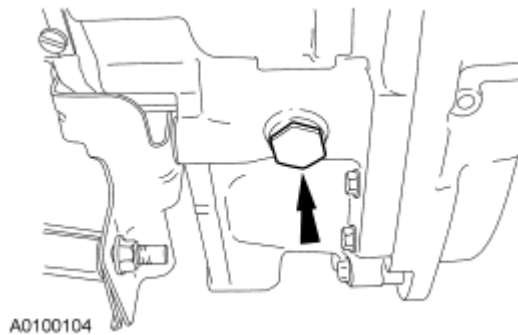
**NOTE:** Lubricate the new O-rings with clean automatic transmission fluid and install them onto the transmission fluid cooler tubes.

10. Connect the transmission fluid cooler tubes to the transaxle.
  - Tighten to 10 Nm (89 lb-in).



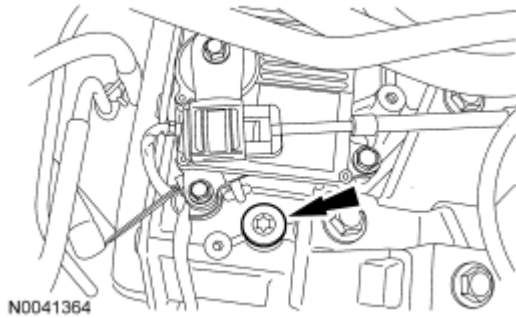
**Fig. 68: Locating Transmission Fluid Cooler Tube Bolts**  
Courtesy of FORD MOTOR CO.

11. Install the transmission fluid drain plug.
  - Tighten to 47 Nm (35 lb-ft).



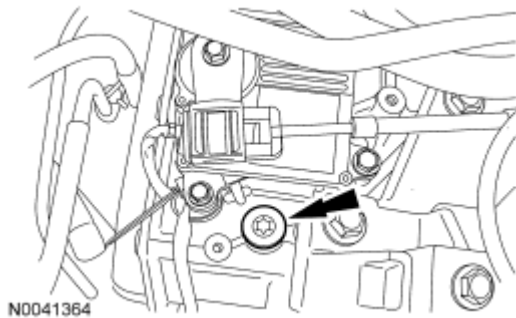
**Fig. 69: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

12. Remove the transmission fluid fill plug.



**Fig. 70: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

13. Fill the transaxle with approximately 4.7L (5 qt) of clean transmission fluid.
14. Install the transmission fluid fill plug.
  - Tighten to 39 Nm (29 lb-ft).



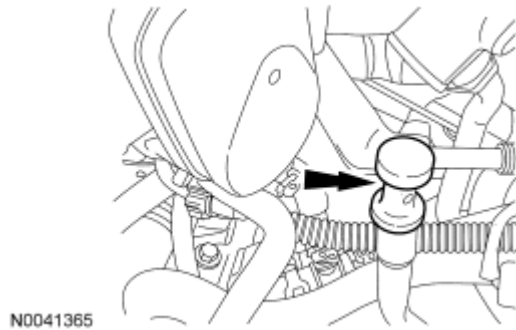
**Fig. 71: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

15. With the transaxle in PARK, the vehicle on a level surface, the engine at idle (680-780 rpm) and foot pressed on the brake, move the selector lever through each gear and allow engagement of each gear. Place the selector lever back in the PARK position.
16. Wipe the transmission fluid level indicator cap and remove the transmission fluid level indicator.
17. Wipe the transmission fluid level indicator with a clean cloth.

**NOTE:** In order to get an accurate transmission fluid level reading, the vehicle should be on a level surface. Idle the engine to reach the normal operating temperature. Using the scan tool, verify that the transaxle is at normal operating temperature 60°C-70°C (140°F-158°F), prior to adjusting the transmission fluid level.

18. If transmission fluid needs to be added, add transmission fluid in 0.25L (1/2 pt) increments through the transmission fluid fill plug located on the top of the transaxle near the transmission fluid level indicator.

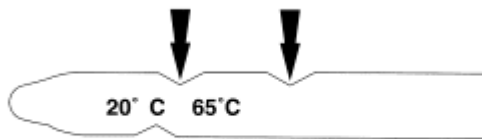
Do not overfill the transmission fluid. Install the transmission fluid level indicator back in the transmission fluid filler tube until it is fully seated, then remove the transmission fluid level indicator. The transmission fluid level should be at the upper most mark on the transmission fluid level indicator. Only fill to the upper most mark on the transmission fluid level indicator. Do not overfill. Damage to the transaxle will occur.



**Fig. 72: Locating Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at normal operating temperature of 60° C-70°C (140°F-158°F) is between the top 2 marks on the transmission fluid level indicator.

19. Fill the transaxle to the correct transmission fluid level.

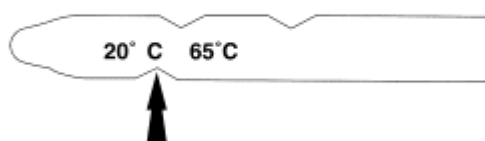


N0044164

**Fig. 73: Locating Temperature Marks On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at cool operating temperature of 15°C-25°C (59°F-77°F), is at the bottom mark on the transmission fluid level indicator.

20. If the TFT is low, fill the transaxle with transmission fluid to the cold range on the transmission fluid level indicator. Recheck the transmission fluid level when the transaxle has reached the normal operating temperature.

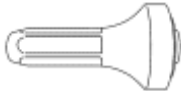


N0044163

**Fig. 74: Locating Bottom Mark On Fluid Level Indicator**  
 Courtesy of FORD MOTOR CO.

## DIFFERENTIAL SEALS - LH

### Special Tools

| Illustration                                                                                    | Tool Name                                                                                                                             | Tool Number |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <br>ST2959-A   | Output Shaft Seal Installer                                                                                                           | 307-567     |
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool |             |

### Material

| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |

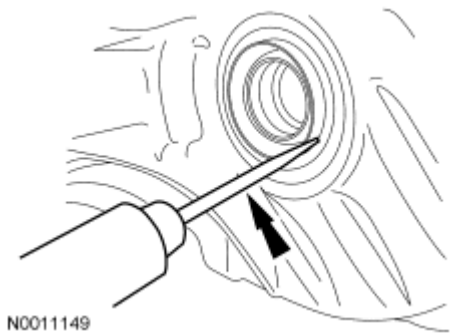
### REMOVAL

**NOTE:** **MERCON®, MERCON® V, MERCON® SP, Motorcraft Premium Automatic Transmission Fluid and Motorcraft Continuously Variable Chain Type Transmission Fluid are not interchangeable transmission fluids. The use of any transmission fluid other than what is recommended for this transaxle will cause transaxle damage.**

1. Remove the LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.

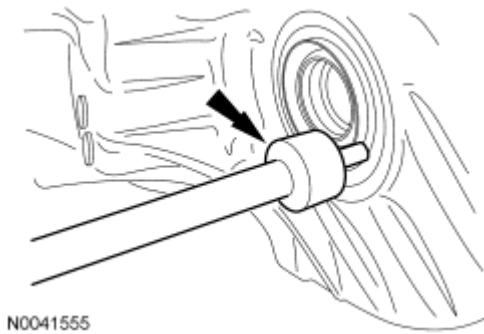
**NOTE:** **Be careful not to damage the case while removing the seal.**

2. Using a suitable awl, poke a small hole in the seal.



**Fig. 75: Poking Small Hole In Seal**  
Courtesy of FORD MOTOR CO.

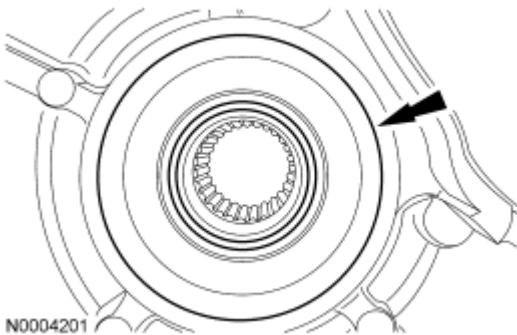
3. Using a suitable dent puller, remove the LH differential fluid seal.



**Fig. 76: Locating Dent Puller**  
Courtesy of FORD MOTOR CO.

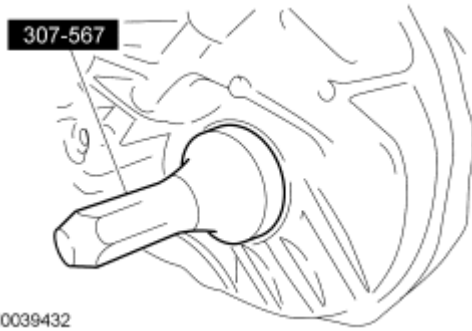
## INSTALLATION

1. Position the new differential fluid seal in place.



**Fig. 77: Positioning Differential Fluid Seal**  
Courtesy of FORD MOTOR CO.

2. Using the Output Shaft Seal Installer, install the outer differential fluid seal.

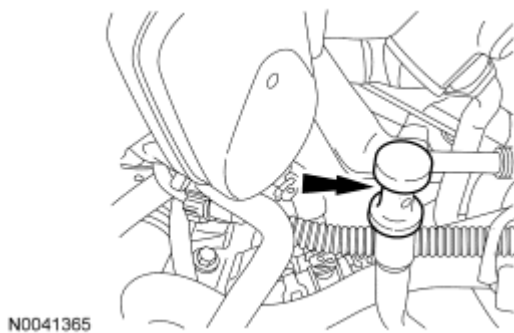


**Fig. 78: Identifying Special Tool (307-567)**  
Courtesy of FORD MOTOR CO.

3. Install the LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
4. With the transaxle in PARK, the vehicle on a level surface, the engine at idle (680-780 rpm) and foot pressed on the brake, move the selector lever through each gear and allow engagement of each gear. Place the selector lever back in the PARK position.
5. Wipe the transmission fluid level indicator cap and remove the transmission fluid level indicator.
6. Wipe the transmission fluid level indicator with a clean cloth.

**NOTE:** In order to get an accurate transmission fluid level reading, the vehicle should be on a level surface. Idle the engine to reach the normal operating temperature. Using the scan tool, verify that the transaxle is at normal operating temperature 60°C-70°C (140°F-158°F), prior to adjusting the transmission fluid level.

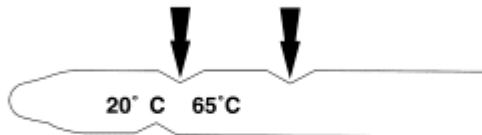
7. If transmission fluid needs to be added, add transmission fluid in 0.25L (1/2 pt) increments through the transmission fluid fill plug located on the top of the transaxle near the transmission fluid level indicator. Do not overfill the transmission fluid. Install the transmission fluid level indicator back in the transmission fluid filler tube until it is fully seated, then remove the transmission fluid level indicator. The transmission fluid level should be at the uppermost mark on the transmission fluid level indicator. Only fill to the uppermost mark on the transmission fluid level indicator. Do not overfill. Damage to the transaxle will occur.



**Fig. 79: Locating Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at normal operating temperature of 60° C-70°C (140°F-158°F) is between the top 2 marks on the transmission fluid level indicator.

8. Fill the transaxle to the correct transmission fluid level.

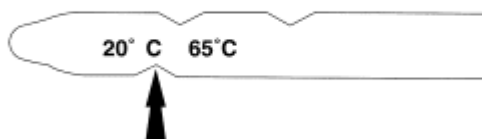


N0044164

**Fig. 80: Locating Temperature Marks On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at cold operating temperature of 15°C-25°C (59°F-77°F) is at the bottom mark on the transmission fluid level indicator.

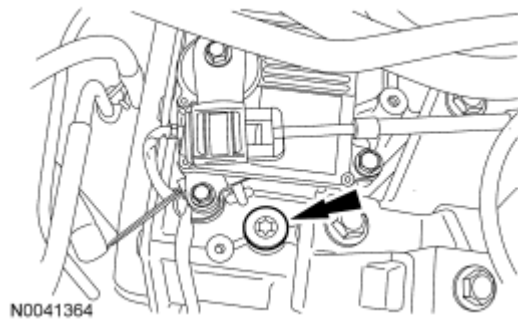
9. If the Transmission Fluid Temperature (TFT) is low, fill the transaxle with transmission fluid to the cold range on the transmission fluid level indicator. Recheck the transmission fluid level when the transaxle has reached the normal operating temperature.



N0044163

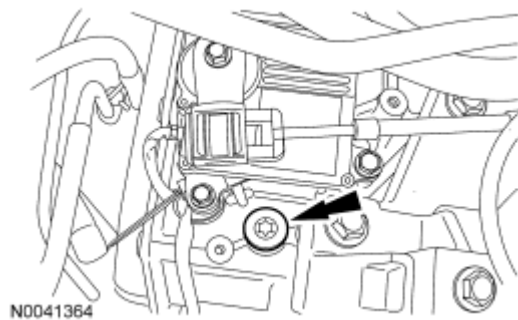
**Fig. 81: Locating Bottom Mark On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

10. Remove the transmission fluid fill plug.



**Fig. 82: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

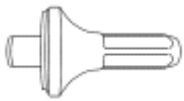
11. Fill the transaxle with clean transmission fluid.
12. Install the transmission fluid fill plug.
  - Tighten to 39 Nm (29 lb-ft).



**Fig. 83: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

## DIFFERENTIAL SEALS - RH, FRONT WHEEL DRIVE (FWD)

### Special Tools

| Illustration                                                                                    | Tool Name                                                                                                                             | Tool Number |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <br>ST2960-A | Output Seal Installer                                                                                                                 | 307-568     |
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool |             |

## Material

| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |

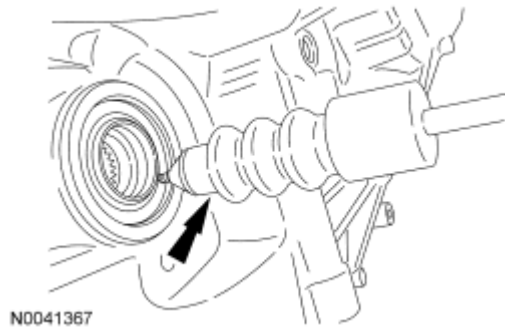
## REMOVAL

**NOTE:** **MERCON®, MERCON® V, MERCON® SP, Motorcraft Premium Automatic Transmission Fluid and Motorcraft Continuously Variable Chain Type Transmission Fluid are not interchangeable transmission fluids. The use of any transmission fluid other than what is recommended for this transaxle will cause transaxle damage.**

1. Remove the RH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.

**NOTE:** **Be careful not to damage the case while removing the seal.**

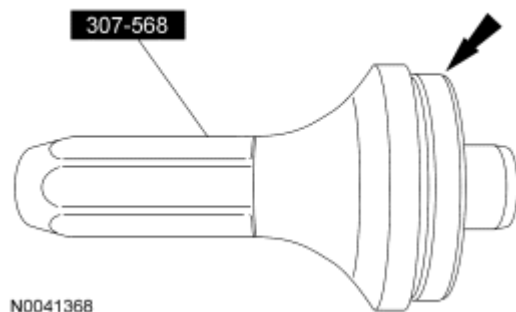
2. Using a suitable dent puller, remove the differential fluid seal.



**Fig. 84: Locating Dent Puller**  
Courtesy of FORD MOTOR CO.

## INSTALLATION

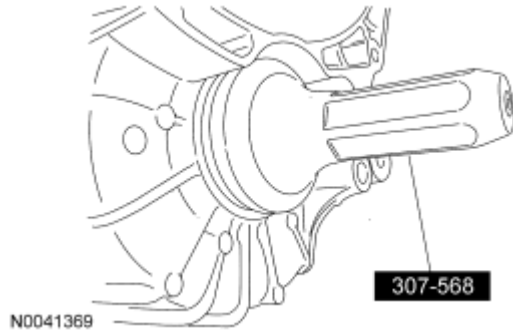
1. Position the new differential fluid seal on the Output Seal Installer.



**Fig. 85: Locating Differential Fluid Seal On Special Tool**

Courtesy of FORD MOTOR CO.

2. Using the Output Seal Installer, install the outer differential fluid seal.

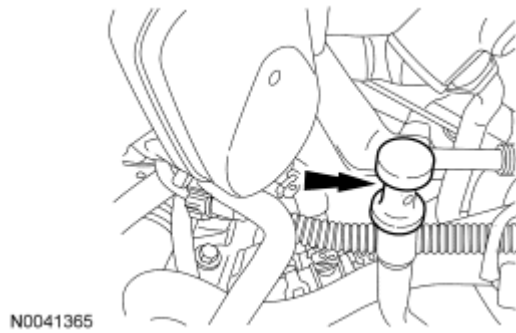


**Fig. 86: Identifying Special Tool (307-568)**  
Courtesy of FORD MOTOR CO.

3. Install the RH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
4. With the transaxle in PARK, the vehicle on a level surface, the engine at idle (680-780 rpm) and foot pressed on the brake, move the selector lever through each gear and allow engagement of each gear. Place the selector lever back in the PARK position.
5. Wipe the transmission fluid level indicator cap and remove the transmission fluid level indicator.
6. Wipe the transmission fluid level indicator with a clean cloth.

**NOTE:** In order to get an accurate transmission fluid level reading, the vehicle should be on a level surface. Idle the engine to reach the normal operating temperature. Using the scan tool, verify that the transaxle is at normal operating temperature 60°C-70°C (140°F-158°F), prior to adjusting the transmission fluid level.

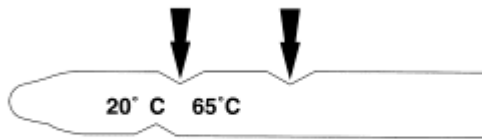
7. If transmission fluid needs to be added, add transmission fluid in 0.25L (1/2 pt) increments through the transmission fluid fill plug located on the top of the transaxle near the transmission fluid level indicator. Do not overfill the transmission fluid. Install the transmission fluid level indicator back in the transmission fluid filler tube until it is fully seated, then remove the transmission fluid lever indicator. The transmission fluid level should be at the uppermost mark on the transmission fluid level indicator. Only fill to the uppermost mark on the transmission fluid level indicator. Do not overfill. Damage to the transaxle will occur.



**Fig. 87: Locating Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at normal operating temperature of 60°C-70°C (140°F-158°F) is between the top 2 marks on the transmission fluid level indicator.

8. Fill the transaxle to the correct transmission fluid level.

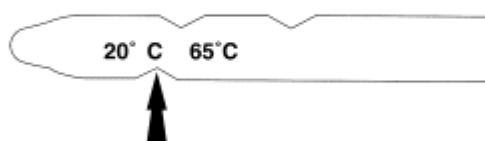


N0044164

**Fig. 88: Locating Temperature Marks On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at cold operating temperature of 15°C-25°C (59°F-77°F) is at the bottom mark on the transmission fluid level indicator.

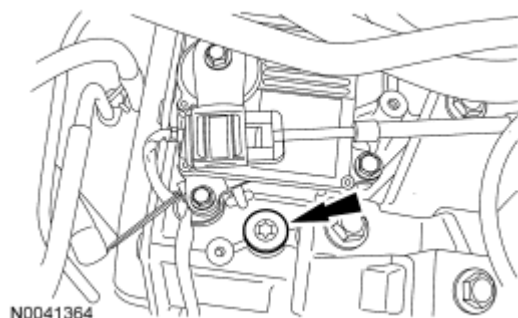
9. If the Transmission Fluid Temperature (TFT) is low, fill the transaxle with transmission fluid to the cold range on the transmission fluid level indicator. Recheck the transmission fluid level when the transaxle has reached the normal operating temperature.



N0044163

**Fig. 89: Locating Bottom Mark On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

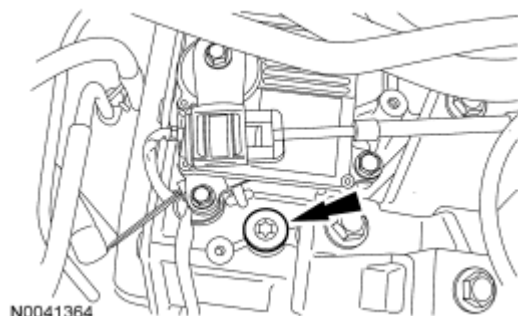
10. Remove the transmission fluid fill plug.



N0041364

**Fig. 90: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

11. Fill the transaxle with clean transmission fluid.
12. Install the transmission fluid fill plug.
  - Tighten to 39 Nm (29 lb-ft).



N0041364

**Fig. 91: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

## DIFFERENTIAL SEALS - RH, ALL WHEEL DRIVE (AWD)

## 2008 Ford Fusion S

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ

### Special Tools

| Illustration                                                                                    | Tool Name                                                                                                                             | Tool Number           |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <br>ST2978A    | Differential Seal Installer                                                                                                           | 307-593               |
| <br>ST1255-A   | Handle                                                                                                                                | 205-153 (T80T-4000-W) |
| <br>ST2924-A   | Remover, Input Shaft Oil Seal                                                                                                         | 308-375               |
| <br>ST1187-A  | Slide Hammer                                                                                                                          | 307-005 (T59L-100-B)  |
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool |                       |

### Material

| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |

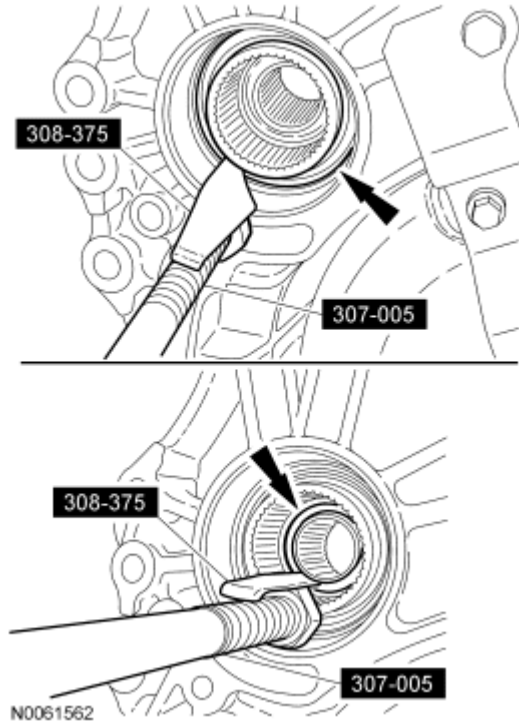
### REMOVAL

**NOTE:** **MERCON®, MERCON® V, MERCON® SP, Motorcraft Premium Automatic Transmission Fluid and Motorcraft Continuously Variable Chain Type Transmission Fluid are not interchangeable transmission fluids. The use of any transmission fluid other than what is recommended for this transaxle will cause transaxle damage.**

1. Remove the Power Transfer Unit (PTU). For additional information, refer to **TRANSFER CASE - POWER TRANSFER UNIT (PTU)** article.

**NOTE:** Transaxle removed for clarity.

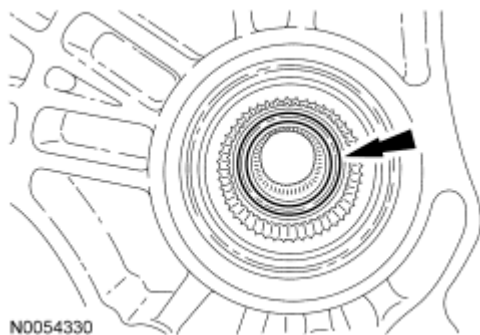
- Using the Input Shaft Oil Seal Remover and Slide Hammer, remove the differential fluid seals.



**Fig. 92: Identifying Differential Fluid Seals & Special Tools (307-005, 308-375)**  
Courtesy of FORD MOTOR CO.

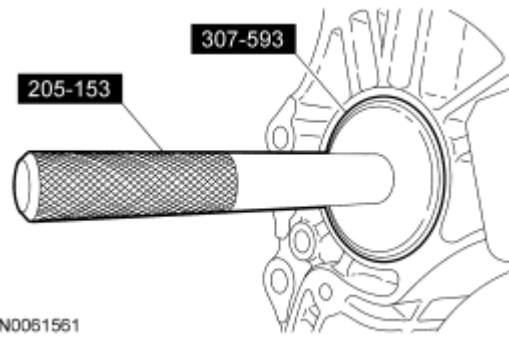
## INSTALLATION

- Position the new inner differential fluid seal in place.



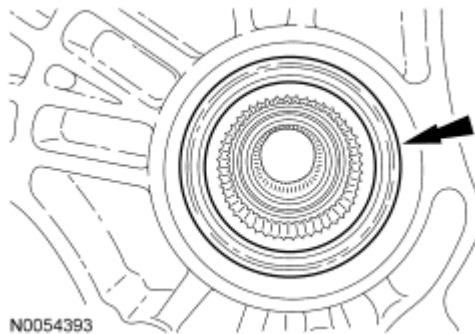
**Fig. 93: Identifying Inner Differential Fluid Seal**  
Courtesy of FORD MOTOR CO.

- Using the Differential Seal Installer and Handle, install the inner differential fluid seal.



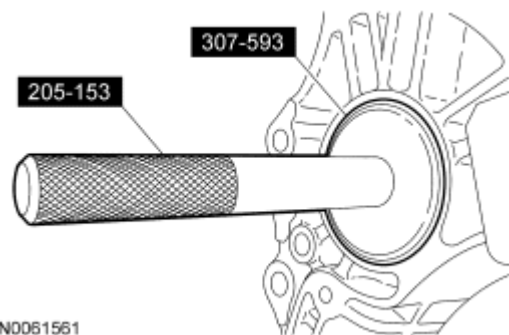
**Fig. 94: Identifying Differential Fluid Seal & Special Tools (307-593, 205-153)**  
Courtesy of FORD MOTOR CO.

3. Position the new outer differential fluid seal in place.



**Fig. 95: Identifying Outer Differential Fluid Seal**  
Courtesy of FORD MOTOR CO.

4. Using the Differential Seal Installer and Handle, install the outer differential fluid seal.



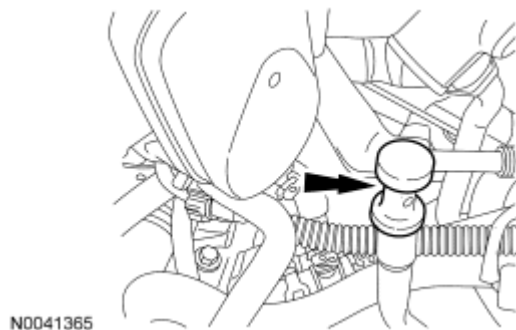
**Fig. 96: Identifying Differential Fluid Seal & Special Tools (307-593, 205-153)**  
Courtesy of FORD MOTOR CO.

5. Install the PTU. For additional information, refer to **TRANSFER CASE - POWER TRANSFER UNIT (PTU)** article.
6. With the transaxle in PARK, the vehicle on a level surface, the engine at idle (680-780 rpm) and foot pressed on the brake, move the selector lever through each gear and allow engagement of each gear. Place the selector lever back in the PARK position.

7. Wipe the transmission fluid level indicator cap and remove the transmission fluid level indicator.
8. Wipe the transmission fluid level indicator with a clean cloth.

**NOTE:** In order to get an accurate transmission fluid level reading, the vehicle should be on a level surface. Idle the engine to reach the normal operating temperature. Using the scan tool, verify that the transaxle is at normal operating temperature 60°C-70°C (140°F-158°F), prior to adjusting the transmission fluid level.

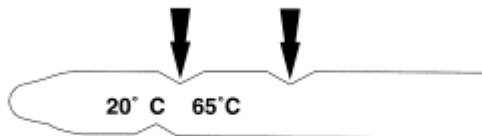
9. If transmission fluid needs to be added, add transmission fluid in 0.25L (1/2 pt) increments through the transmission fluid fill plug located on the top of the transaxle near the transmission fluid level indicator. Do not overfill the transmission fluid. Install the transmission fluid level indicator back in the transmission fluid filler tube until it is fully seated, then remove the transmission fluid level indicator. The transmission fluid level should be at the uppermost mark on the transmission fluid level indicator. Only fill to the uppermost mark on the transmission fluid level indicator. Do not overfill. Damage to the transaxle will occur.



**Fig. 97: Locating Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at normal operating temperature of 60°C-70°C (140°F-158°F) is between the top 2 marks on the transmission fluid level indicator.

10. Fill the transaxle to the correct transmission fluid level.



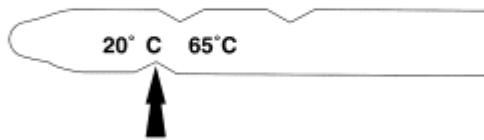
N0044164

**Fig. 98: Locating Temperature Marks On Fluid Level Indicator**

Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at cold operating temperature of 15°C-25°C (59°F-77°F) is at the bottom mark on the transmission fluid level indicator.

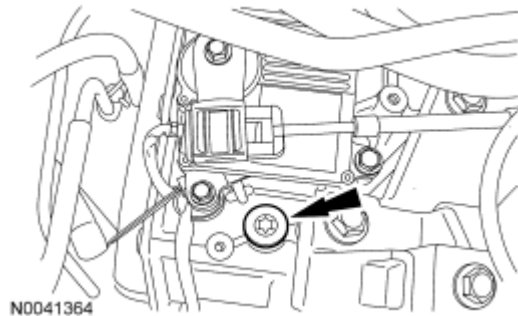
11. If the Transmission Fluid Temperature (TFT) is low, fill the transaxle with transmission fluid to the cold range on the transmission fluid level indicator. Recheck the transmission fluid level when the transaxle has reached the normal operating temperature.



N0044163

**Fig. 99: Locating Bottom Mark On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

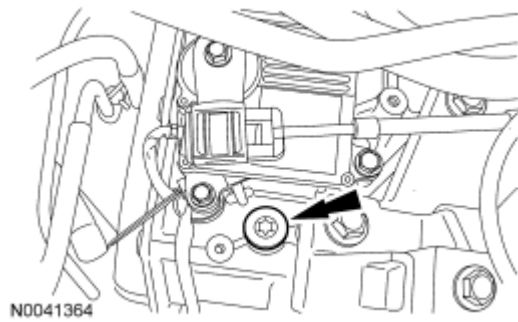
12. Remove the transmission fluid fill plug.



N0041364

**Fig. 100: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

13. Fill the transaxle with clean transmission fluid.
14. Install the transmission fluid fill plug.
  - Tighten to 39 Nm (29 lb-ft).

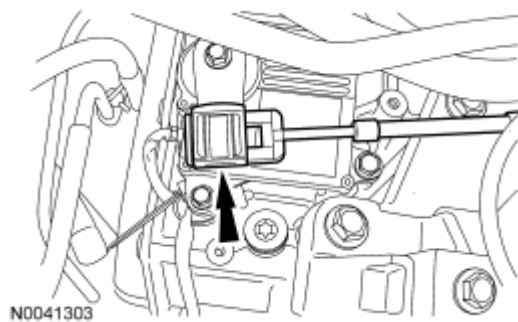


**Fig. 101: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

## TRANSMISSION CONTROL MODULE (TCM)

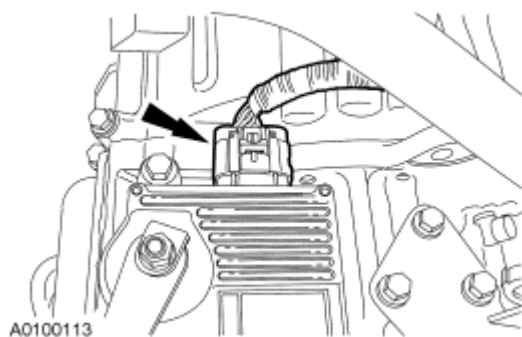
### REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the air cleaner assembly. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 2.3L** article or **INTAKE AIR DISTRIBUTION AND FILTERING - 3.0L (4V)** article.
4. Disconnect the selector lever cable end.



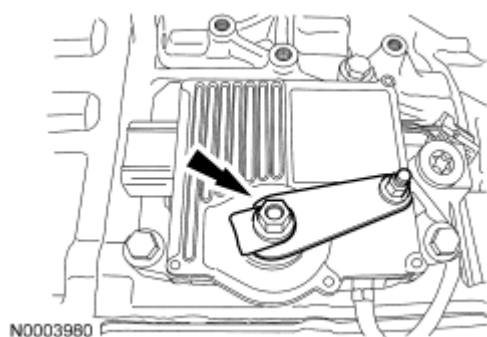
**Fig. 102: Locating Selector Lever Cable End**  
Courtesy of FORD MOTOR CO.

5. Disconnect the Transmission Control Module (TCM) electrical connector.



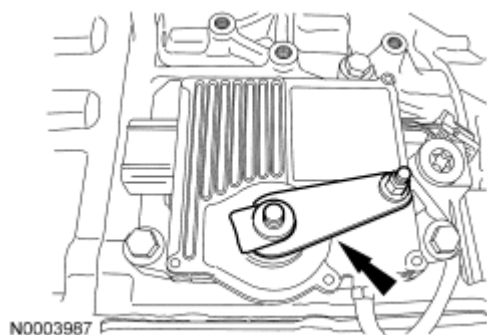
**Fig. 103: Locating TCM Electrical Connector**  
Courtesy of FORD MOTOR CO.

6. Remove the manual control lever nut.



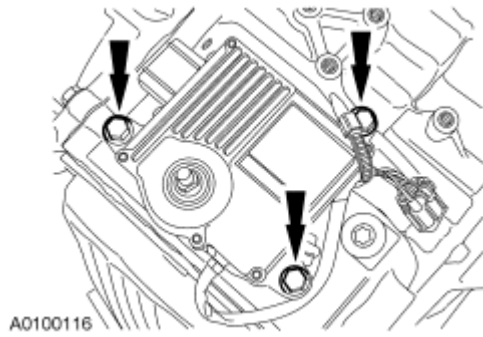
**Fig. 104: Locating Manual Control Lever Nut**  
Courtesy of FORD MOTOR CO.

7. Remove the manual control lever.



**Fig. 105: Locating Manual Control Lever**  
Courtesy of FORD MOTOR CO.

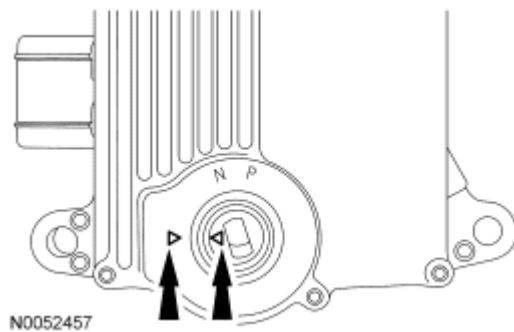
8. Remove the bolts and remove the TCM.



**Fig. 106: Locating TCM Bolts**  
Courtesy of FORD MOTOR CO.

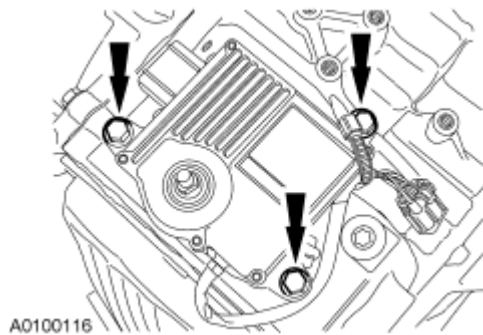
## INSTALLATION

1. Verify that the manual lever position markings are aligned. Markings should indicate that the manual lever is in the OVERDRIVE position.



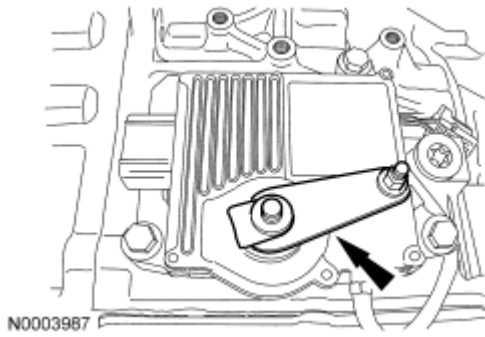
**Fig. 107: Locating Manual Lever Position Markings**  
Courtesy of FORD MOTOR CO.

2. Install the TCM.
  - Tighten to 24 Nm (18 lb-ft).



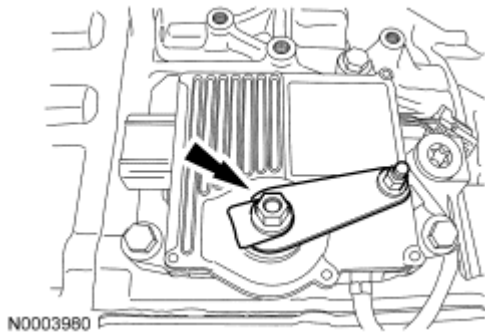
**Fig. 108: Locating TCM Bolts**  
Courtesy of FORD MOTOR CO.

3. Install the manual control lever.



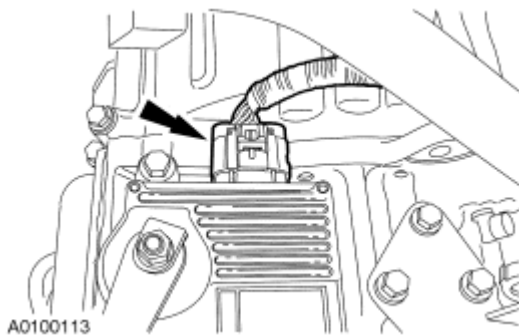
**Fig. 109: Locating Manual Control Lever**  
Courtesy of FORD MOTOR CO.

4. Install the manual control lever nut.
  - Tighten to 12 Nm (106 lb-in).



**Fig. 110: Locating Manual Control Lever Nut**  
Courtesy of FORD MOTOR CO.

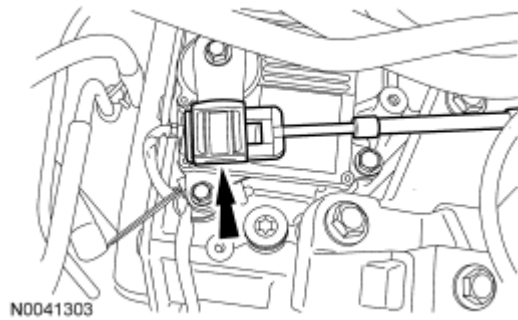
5. Connect the TCM electrical connector.



**Fig. 111: Locating TCM Electrical Connector**  
Courtesy of FORD MOTOR CO.

**NOTE:** Support the underside of the manual control lever when installing the selector lever cable or damage to the manual control lever or shaft may occur.

6. Connect the selector lever cable end.



**Fig. 112: Locating Selector Lever Cable End**  
Courtesy of FORD MOTOR CO.

7. Install the air cleaner assembly. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 2.3L** article or **INTAKE AIR DISTRIBUTION AND FILTERING - 3.0L (4V)** article.
8. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
9. Carry out the TCM initial learning procedure. For additional information, refer to **Transmission Control Module (TCM) Initial Learning**.
10. Check for correct vehicle operation.

## TRANSAXLE SUPPORT INSULATOR

### Special Tools

| Illustration | Tool Name               | Tool Number         |
|--------------|-------------------------|---------------------|
|              | Lifting Bracket, Engine | 303-050 (T70P-6000) |
|              | Oil Pan Holding Fixture | 303-1295            |
|              | Support Bar, Engine     | 303-F072            |
|              |                         |                     |

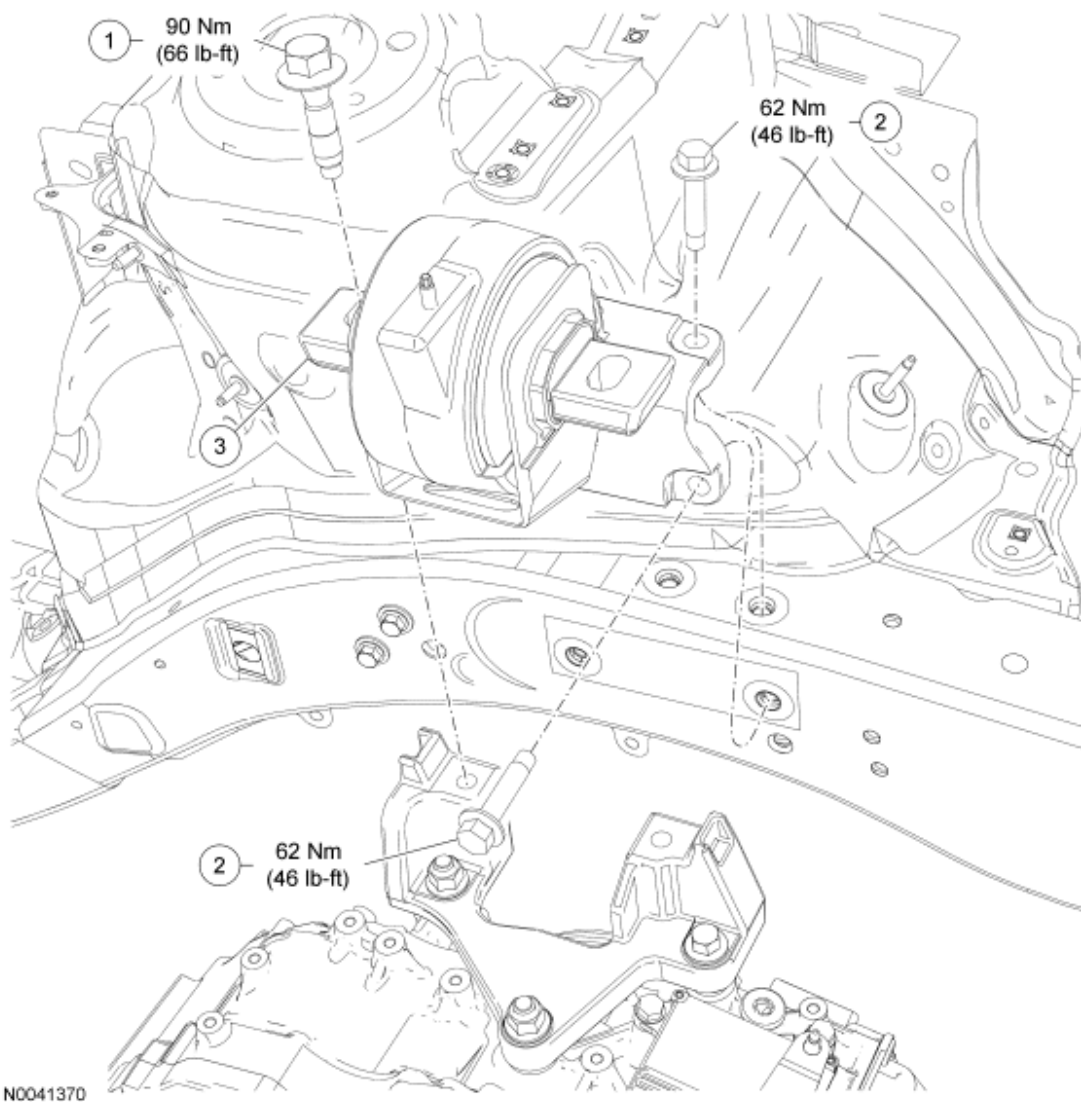
## 2008 Ford Fusion S

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ

|                                                                                                  |                            |          |
|--------------------------------------------------------------------------------------------------|----------------------------|----------|
|  <p>ST2743A</p> | Universal Adapter Brackets | 014-0001 |
|--------------------------------------------------------------------------------------------------|----------------------------|----------|

### Material

| Item                           | Specification |
|--------------------------------|---------------|
| Threadlock and Sealer<br>TA-25 | WSK-M2G351-A5 |

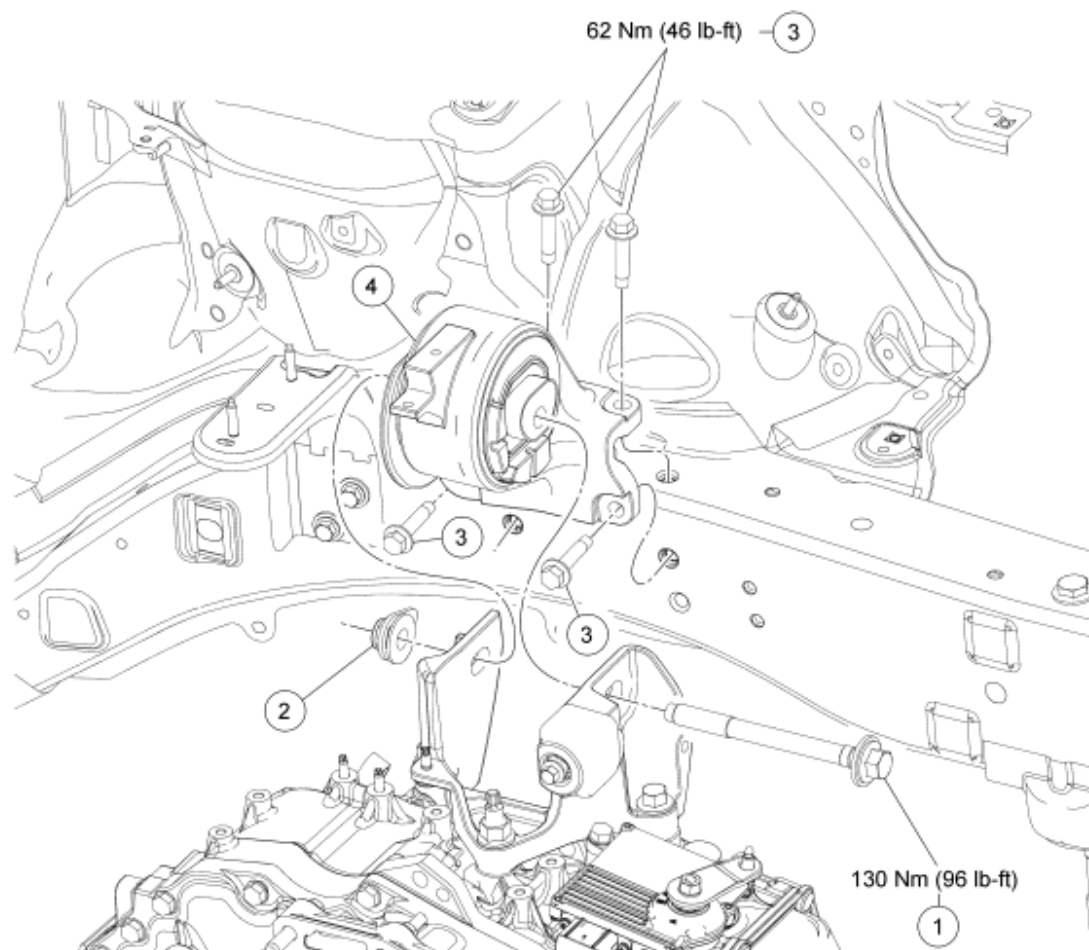


**Fig. 113: Exploded View Of Transaxle Support Insulator With Torque Specifications - 3.0L Engine**  
Courtesy of FORD MOTOR CO.

## 2008 Ford Fusion S

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ

| Item | Part Number | Description                                              |
|------|-------------|----------------------------------------------------------|
| 1    | W711724     | Transaxle support insulator-to-bracket bolt (2 required) |
| 2    | W709234     | Transaxle insulator-to-frame bolts (4 required)          |
| 3    | 6F020       | Transaxle insulator                                      |



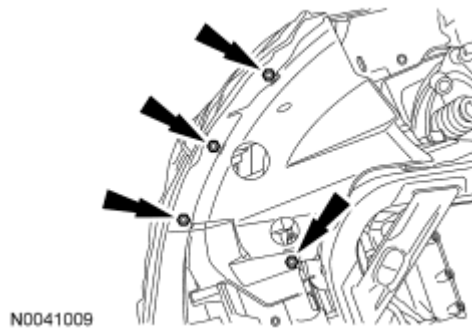
N0054328

**Fig. 114: Exploded View Of Transaxle Support Insulator With Torque Specifications - 3.5L Engine**  
Courtesy of FORD MOTOR CO.

| Item | Part Number | Description                               |
|------|-------------|-------------------------------------------|
| 1    | W711873     | Transaxle insulator through bolt          |
| 2    | W711872     | Transaxle insulator through bolt flangnut |
| 3    | W709234     | Transaxle insulator-to-frame bolts        |
| 4    | 6F020       | Transaxle insulator                       |

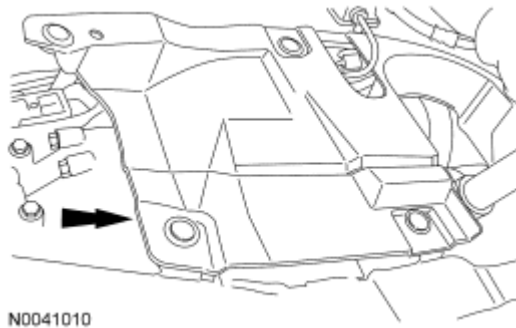
**REMOVAL****All vehicles**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the battery and battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the 4 screws and position the LH fender splash shield aside.



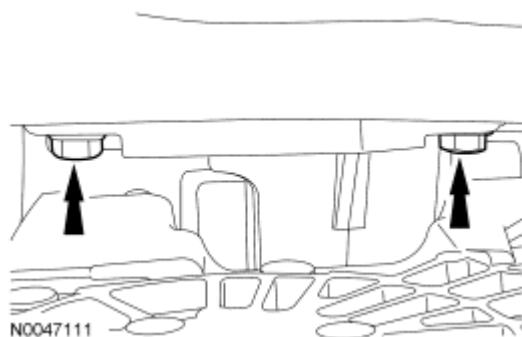
**Fig. 115: Locating LH Fender Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

4. Remove the 6 pin-type retainers and the LH front structure-to-subframe splash shield.



**Fig. 116: Locating LH Front Structure-To-Subframe Splash Shield**  
Courtesy of FORD MOTOR CO.

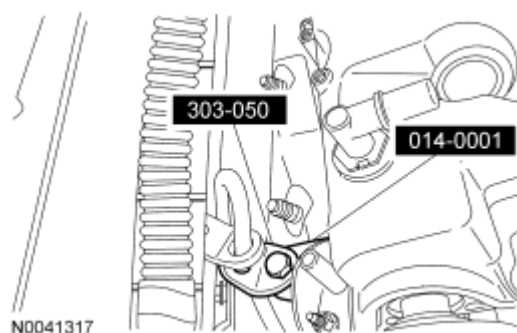
5. Remove the lower 2 transaxle insulator-to-frame bolts.



**Fig. 117: Locating Bolts On Rear Transaxle Insulator**  
Courtesy of FORD MOTOR CO.

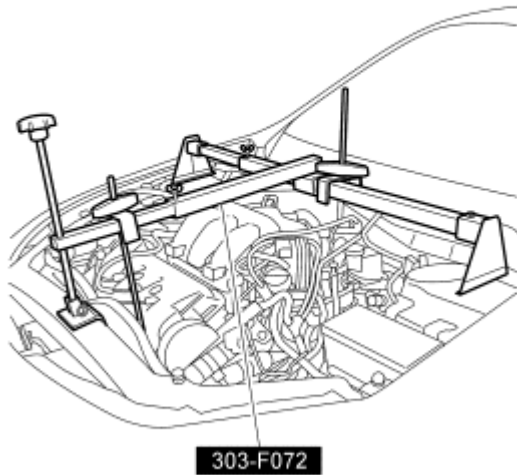
### 3.0L engine

6. Install the Engine Lifting Bracket and Universal Adapter Bracket "L" hook on the LH side of the engine.



**Fig. 118: Identifying Universal Lifting Brackets**  
Courtesy of FORD MOTOR CO.

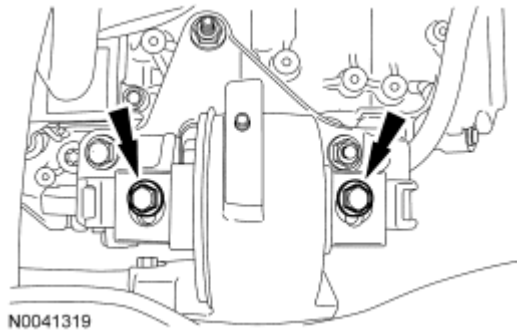
7. Install the Engine Support Bar to support the engine.



N0082626

**Fig. 119: Installing Engine Support Bar To Support Engine**  
Courtesy of FORD MOTOR CO.

8. Remove the 2 transaxle support insulator-to-bracket bolts.



N0041319

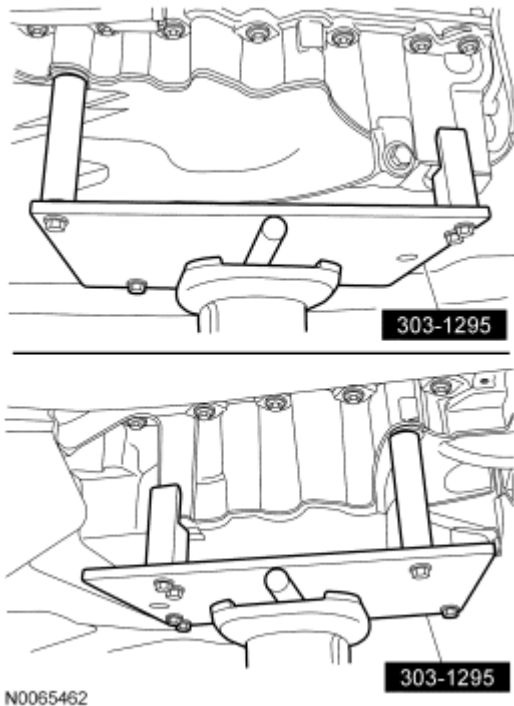
**Fig. 120: Locating Transaxle Insulator Bolts**  
Courtesy of FORD MOTOR CO.

### 3.5L engine

9. Remove the exhaust Y-pipe. For additional information, refer to **EXHAUST SYSTEM** article.

**NOTE:** The Oil Pan Holding Fixture must be carefully aligned to the mounting bosses on the oil pan. Failure to follow these instructions may result in damage to the oil pan.

10. Position a floor jack and the Oil Pan Holding Fixture under the oil pan.



**Fig. 121: Positioning Floor Jack & Special Tool (303-1295) Under Oil Pan**  
Courtesy of FORD MOTOR CO.

11. Remove the air cleaner. For additional information, refer to **ENGINE - 3.5L** article.  
12. Remove the transaxle support insulator through bolt.

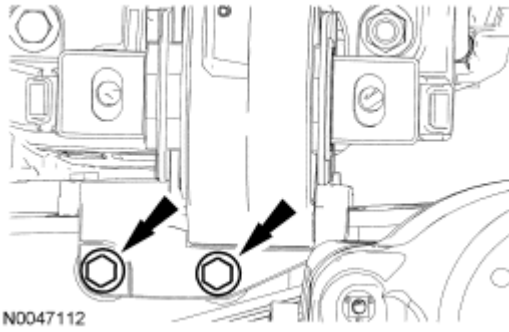


**Fig. 122: Identifying Transaxle Support Insulator Through Bolt**  
Courtesy of FORD MOTOR CO.

**All vehicles**

**NOTE:** 3.0L engine shown, 3.5L engine similar.

13. Remove the upper 2 transaxle insulator-to-frame bolts and remove the transaxle insulator.



**Fig. 123: Locating Upper Bolts On Rear Transaxle Insulator**  
Courtesy of FORD MOTOR CO.

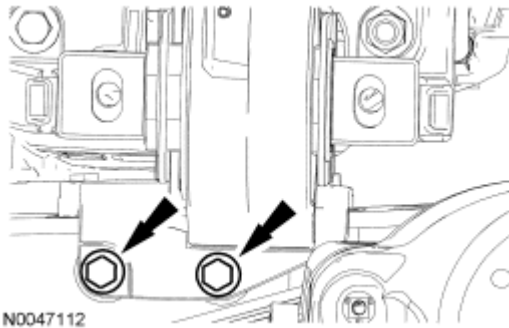
## INSTALLATION

### All vehicles

1. Clean the rear transaxle support insulator bolts using a wire brush and apply new threadlock to the threads.

**NOTE:** 3.0L engine shown, 3.5L engine similar.

2. Position the transaxle support insulator in place and install the upper 2 transaxle insulator-to-frame bolts.
  - Tighten to 62 Nm (46 lb-ft).



**Fig. 124: Locating Upper Bolts On Rear Transaxle Insulator**  
Courtesy of FORD MOTOR CO.

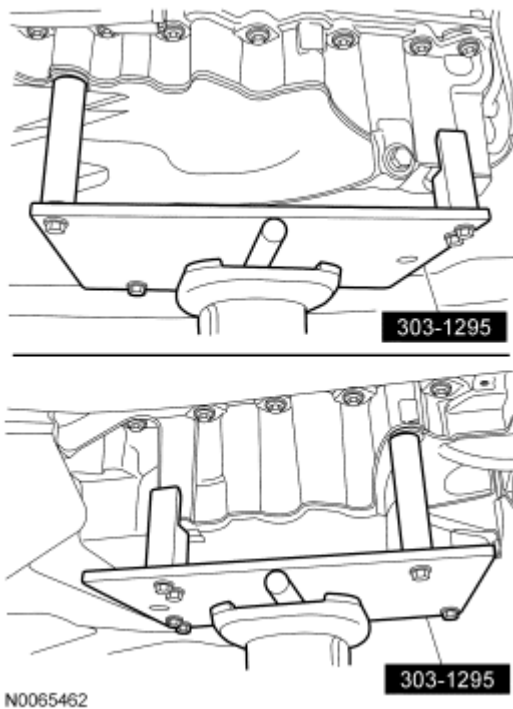
### 3.5L engine

3. Install the transaxle insulator through bolt and flagnut.
  - Tighten to 130 Nm (96 lb-ft).



**Fig. 125: Identifying Transaxle Support Insulator Through Bolt**  
Courtesy of FORD MOTOR CO.

4. Remove the floor jack and the Oil Pan Holding Fixture.

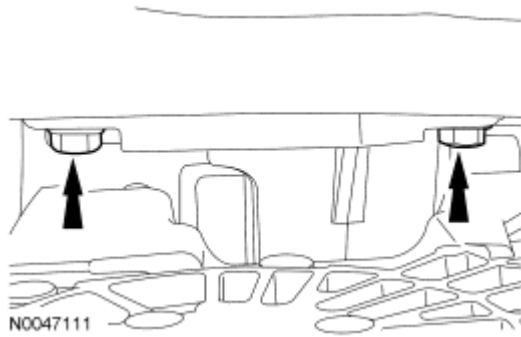


**Fig. 126: Positioning Floor Jack & Special Tool (303-1295) Under Oil Pan**  
Courtesy of FORD MOTOR CO.

5. Install the air cleaner. For additional information, refer to **ENGINE - 3.5L** article.
6. Install the exhaust Y-pipe. For additional information, refer to **EXHAUST SYSTEM** article.

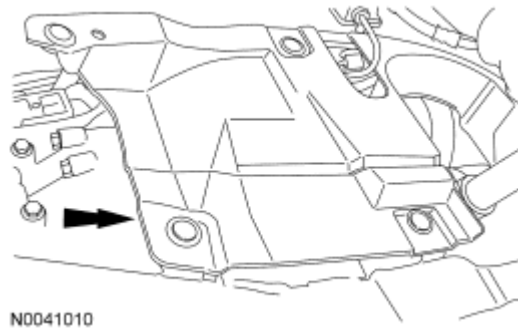
#### All vehicles

7. Position the transaxle support insulator in place and install the lower 2 transaxle insulator-to-frame bolts.
  - Tighten to 62 Nm (46 lb-ft).



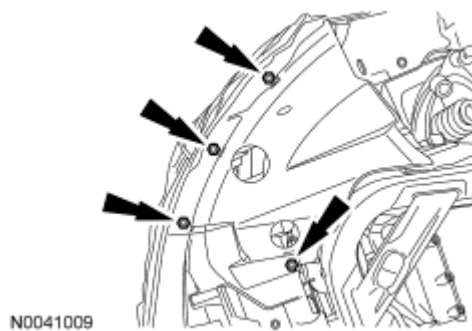
**Fig. 127: Locating Bolts On Rear Transaxle Insulator**  
 Courtesy of FORD MOTOR CO.

8. Position the LH front structure-to-subframe splash shield in place and install the 6 pin-type retainers.



**Fig. 128: Locating LH Front Structure-To-Subframe Splash Shield**  
 Courtesy of FORD MOTOR CO.

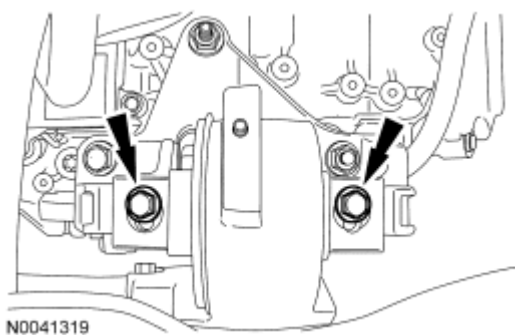
9. Position the LH splash shield in place and install the 4 screws.



**Fig. 129: Locating LH Fender Splash Shield Screws**  
 Courtesy of FORD MOTOR CO.

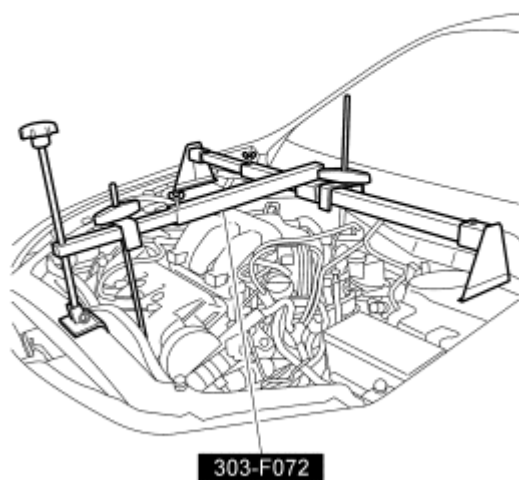
### 3.0L engine

10. Install the 2 transaxle support insulator-to-bracket bolts.
  - Tighten to 90 Nm (66 lb-ft).



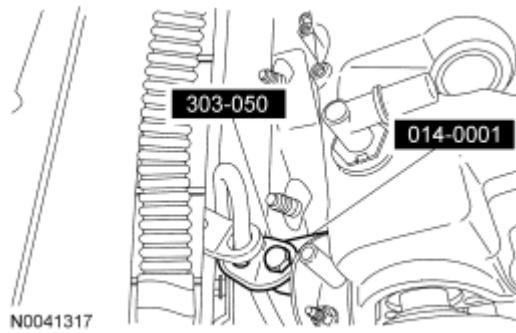
**Fig. 130: Locating Transaxle Insulator Bolts**  
Courtesy of FORD MOTOR CO.

11. Remove the Engine Support Bar.



**Fig. 131: Installing Engine Support Bar To Support Engine**  
Courtesy of FORD MOTOR CO.

12. Remove the Engine Lifting Bracket and Universal Adapter Bracket "L" hook from the LH side of the engine.



**Fig. 132: Identifying Universal Lifting Brackets**  
Courtesy of FORD MOTOR CO.

#### All vehicles

13. Install the battery and battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

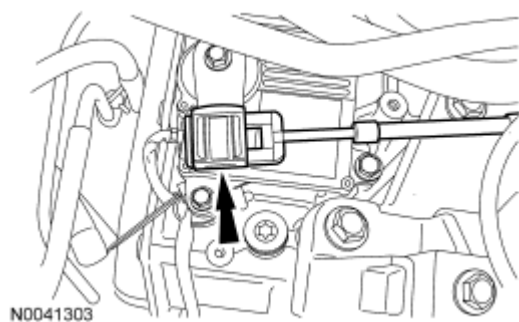
### MANUAL CONTROL LEVER SHAFT AND SEAL

#### Special Tools

| Illustration                                                                                    | Tool Name                         | Tool Number |
|-------------------------------------------------------------------------------------------------|-----------------------------------|-------------|
| <br>ST2474-A | Installer, Shift Shaft Fluid Seal | 307-549     |

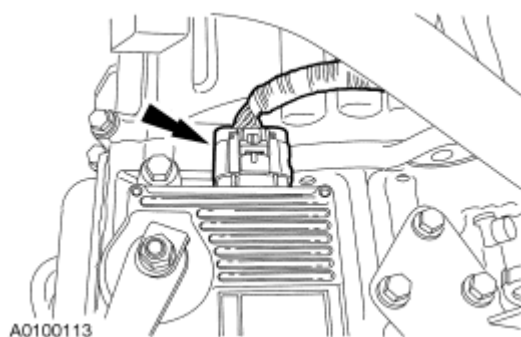
### REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the air cleaner assembly. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 2.3L** article or **INTAKE AIR DISTRIBUTION AND FILTERING - 3.0L (4V)** article.
4. Disconnect the selector lever cable end.



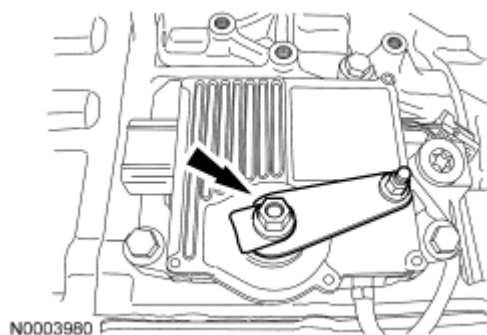
**Fig. 133: Locating Selector Lever Cable End**  
Courtesy of FORD MOTOR CO.

5. Disconnect the Transmission Control Module (TCM) electrical connector.



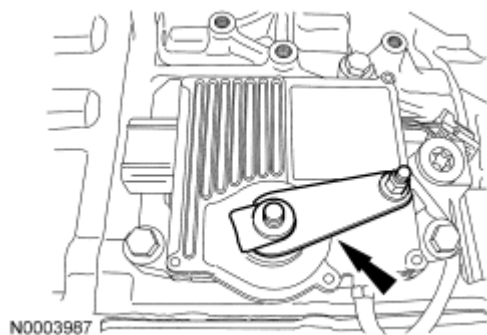
**Fig. 134: Locating TCM Electrical Connector**  
Courtesy of FORD MOTOR CO.

6. Remove the manual control lever nut.



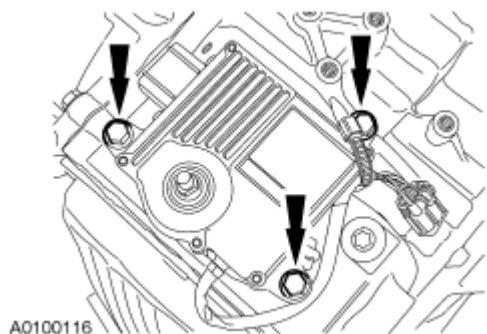
**Fig. 135: Locating Manual Control Lever Nut**  
Courtesy of FORD MOTOR CO.

7. Remove the manual control lever.



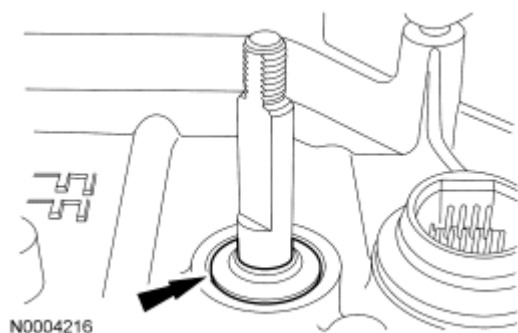
**Fig. 136: Locating Manual Control Lever**  
Courtesy of FORD MOTOR CO.

8. Remove the bolts and remove the TCM.



**Fig. 137: Locating TCM Bolts**  
Courtesy of FORD MOTOR CO.

9. Using a suitable pick, remove the manual control lever seal.



**Fig. 138: Locating Manual Control Lever Seal**  
Courtesy of FORD MOTOR CO.

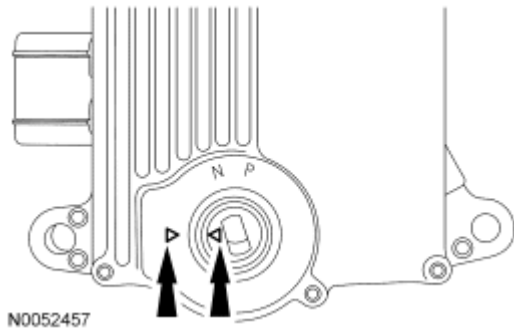
## INSTALLATION

1. Using the Shift Shaft Fluid Seal Installer, install the manual control lever seal.



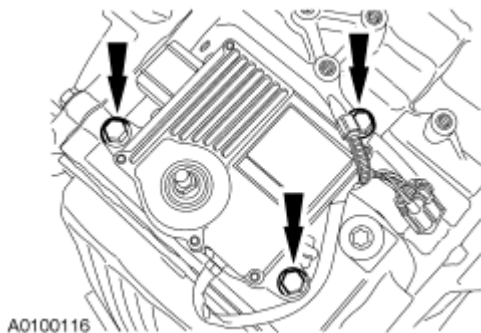
**Fig. 139: Installing Manual Control Lever Seal**  
Courtesy of FORD MOTOR CO.

2. Verify that the manual lever position markings are aligned. Markings should indicate that the manual lever is in the OVERDRIVE position.



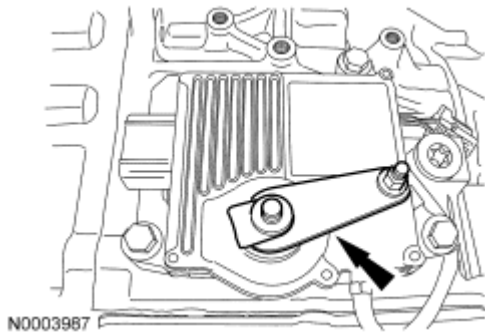
**Fig. 140: Locating Manual Lever Position Markings**  
Courtesy of FORD MOTOR CO.

3. Install the TCM.
  - Tighten to 24 Nm (18 lb-ft).



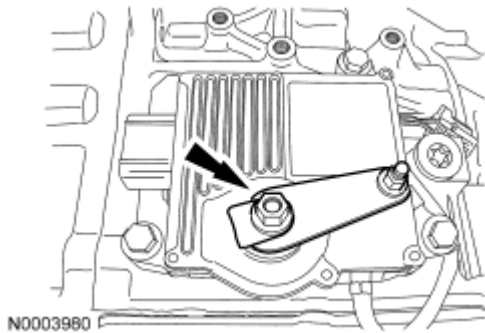
**Fig. 141: Locating TCM Bolts**  
Courtesy of FORD MOTOR CO.

4. Install the manual control lever.



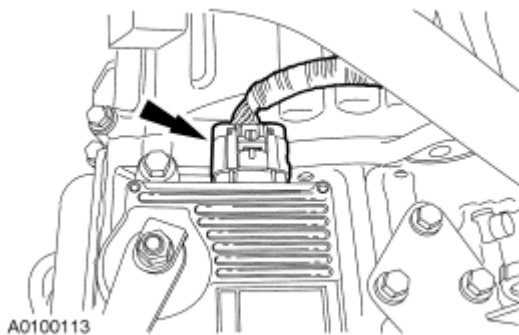
**Fig. 142: Locating Manual Control Lever**  
Courtesy of FORD MOTOR CO.

5. Install the manual control lever nut.
  - Tighten to 12 Nm (106 lb-in).



**Fig. 143: Locating Manual Control Lever Nut**  
Courtesy of FORD MOTOR CO.

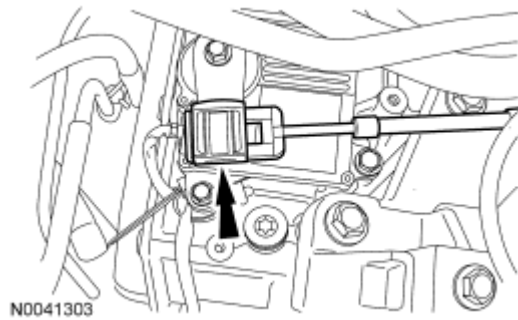
6. Connect the TCM electrical connector.



**Fig. 144: Locating TCM Electrical Connector**  
Courtesy of FORD MOTOR CO.

**NOTE:** Support the underside of the manual control lever when installing the selector lever cable or damage to the manual control lever or shaft may occur.

7. Connect the selector lever cable end.



**Fig. 145: Locating Selector Lever Cable End**  
Courtesy of FORD MOTOR CO.

8. Install the air cleaner assembly. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 2.3L** article or **INTAKE AIR DISTRIBUTION AND FILTERING - 3.0L (4V)** article.
9. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
10. Check for correct vehicle operation.

## REMOVAL

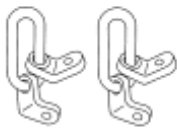
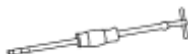
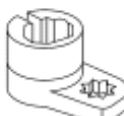
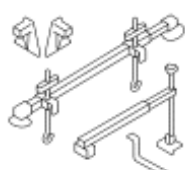
### TRANSAXLE - 3.0L

#### Special Tools

| Illustration | Tool Name                  | Tool Number           |
|--------------|----------------------------|-----------------------|
| <br>ST2646-A | Adapter for 204-592        | 204-592/1             |
| <br>ST1200-A | Bearing Cup Puller         | 308-047 (T77F-1102-A) |
| <br>ST2873-A | Engine Lifting Bracket Set | 303-1140              |
|              |                            |                       |

## 2008 Ford Fusion S

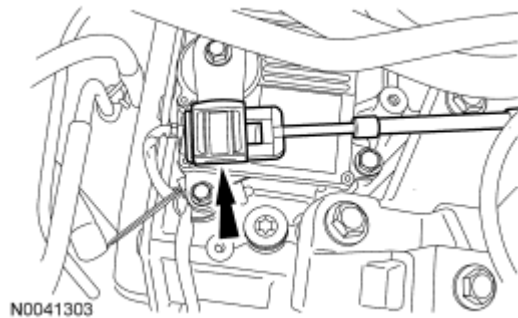
2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ

|                                                                                                     |                                   |                                      |
|-----------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------|
|  <p>ST2793-A</p>   | Lifting Bracket, Engine           | 303-050 (T70P-6000)                  |
|  <p>ST2272-A</p>   | Remover, Front Wheel Hub          | 205-D070 (D93P-1175-B) or equivalent |
|  <p>ST2945-A</p>   | Separator, Ball Joint             | 204-592                              |
|  <p>ST1185-A</p>   | Slide Hammer                      | 100-001 (T50T-100-A)                 |
|  <p>ST1447-A</p> | Socket, Exhaust Gas Oxygen Sensor | 303-476 (T94P-9472-A)                |
|  <p>ST2425-A</p> | Support Bar, Engine               | 303-F072                             |
|  <p>ST2743A</p>  | Universal Adapter Brackets        | 014-0001                             |

### All vehicles

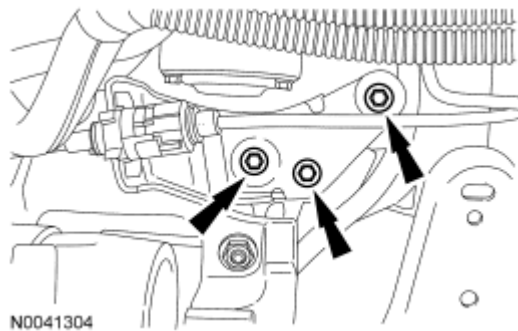
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the battery and battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

3. Remove the air cleaner and the outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 2.3L** article or **INTAKE AIR DISTRIBUTION AND FILTERING - 3.0L (4V)** article.
4. Disconnect the selector lever cable end.



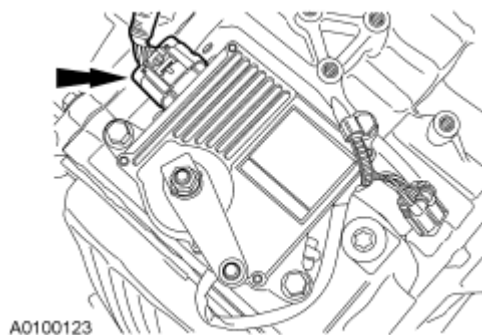
**Fig. 146: Locating Selector Lever Cable End**  
Courtesy of FORD MOTOR CO.

5. Remove the 3 bolts for the selector lever cable bracket and position the cable and bracket aside.



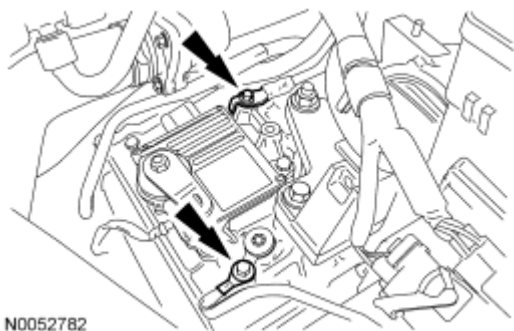
**Fig. 147: Locating Transaxle Control Cable Bracket Bolts**  
Courtesy of FORD MOTOR CO.

6. Disconnect the wire harness from the Transmission Control Module (TCM).



**Fig. 148: Identifying Transmission Control Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

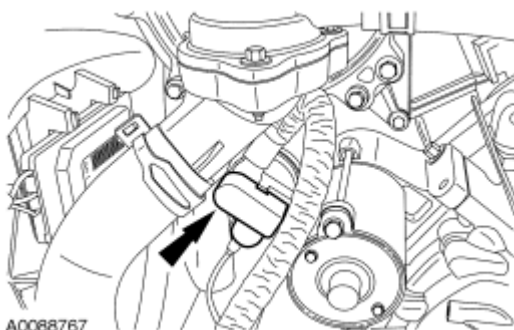
7. Remove the 2 ground strap bolts and position aside the ground straps.



N0052782

**Fig. 149: Identifying Ground Straps & Ground Strap Bolts**  
Courtesy of FORD MOTOR CO.

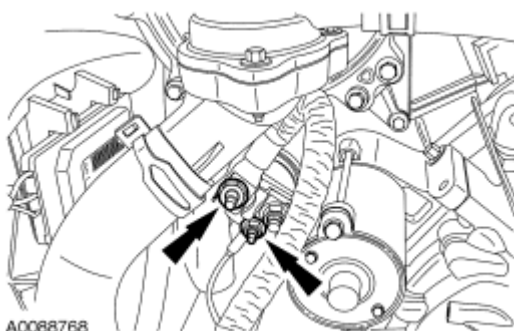
8. Remove the electrical terminal cover for the starter motor electrical connectors.



A0088767

**Fig. 150: Identifying Electrical Cover For Starter Motor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

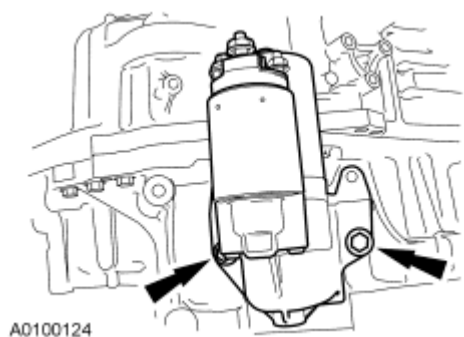
9. Remove the starter terminals.



A0088768

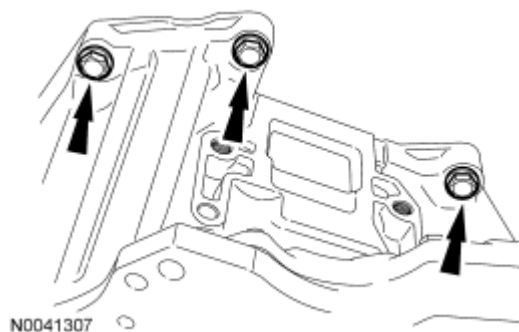
**Fig. 151: Identifying Starter Motor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

10. Remove the 2 bolts and the starter.



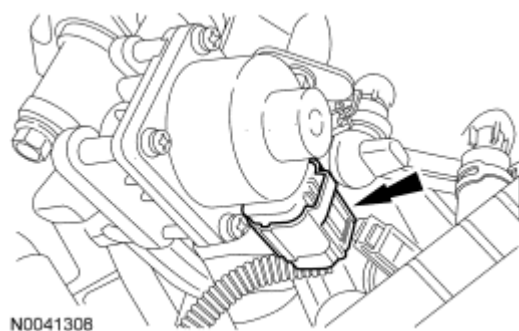
**Fig. 152: Locating Starter Bolts**  
Courtesy of FORD MOTOR CO.

11. Remove the 3 upper torque converter housing bolts.



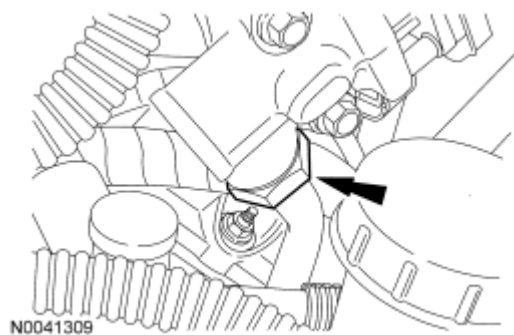
**Fig. 153: Locating Upper Torque Converter Housing Bolts**  
Courtesy of FORD MOTOR CO.

12. Disconnect the EGR valve electrical connector.



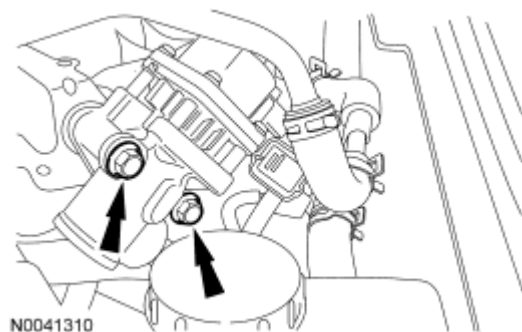
**Fig. 154: Locating EGR Valve Electrical Connector**  
Courtesy of FORD MOTOR CO.

13. Disconnect the EGR tube nut from the valve.



**Fig. 155: Locating EGR Tube Nut**  
Courtesy of FORD MOTOR CO.

14. Remove the 2 bolts and the EGR valve. Discard the gasket.



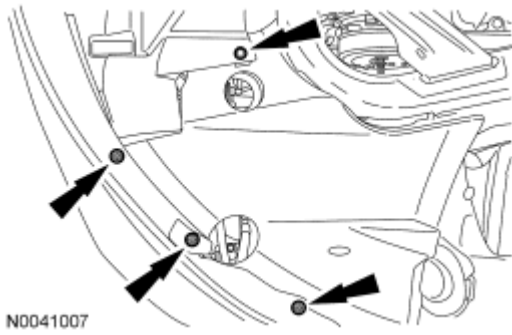
**Fig. 156: Locating EGR Valve And Bolts**  
Courtesy of FORD MOTOR CO.

15. Remove the bolt from the power steering line bracket and position it aside.



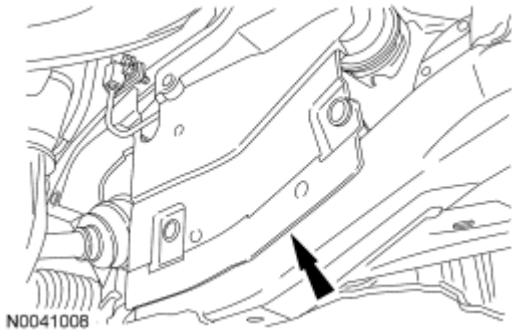
**Fig. 157: Locating Bracket For Power Steering Hose**  
Courtesy of FORD MOTOR CO.

16. Remove the 4 screws and position the RH fender splash shield aside.



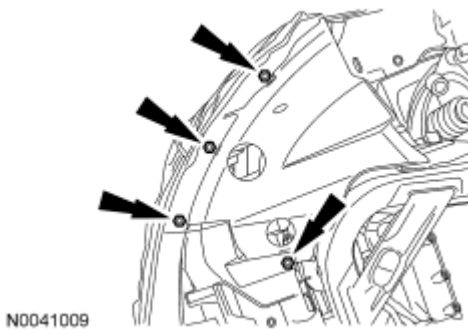
**Fig. 158: Locating RH Fender Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

17. Remove the 6 pin-type retainers and remove the RH front structure to subframe splash shield.



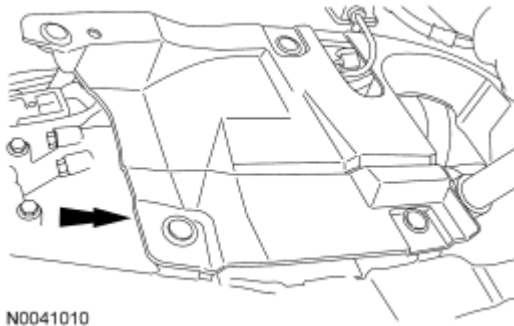
**Fig. 159: Locating RH Front Structure-To-Subframe Splash Shield**  
Courtesy of FORD MOTOR CO.

18. Remove the 4 screws and position the LH fender splash shield aside.



**Fig. 160: Locating LH Fender Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

19. Remove the pin-type retainers and remove the LH front structure to subframe splash shield.

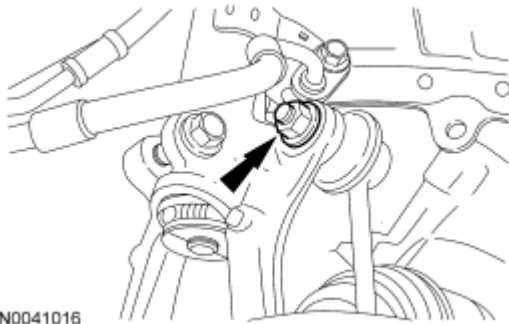


N0041010

**Fig. 161: Locating LH Front Structure-To-Subframe Splash Shield**  
Courtesy of FORD MOTOR CO.

**NOTE:** LH shown, RH similar.

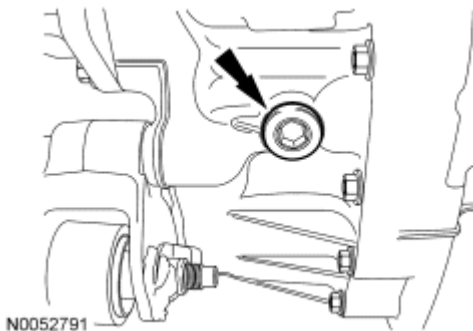
20. Remove the 2 nuts and separate the sway bar links from the struts.



N0041016

**Fig. 162: Locating Sway Bar Links Nut**  
Courtesy of FORD MOTOR CO.

21. If a transaxle exchange or overhaul is required, the transmission fluid must be drained.
- Remove the transmission fluid drain plug and allow the transmission fluid to drain.

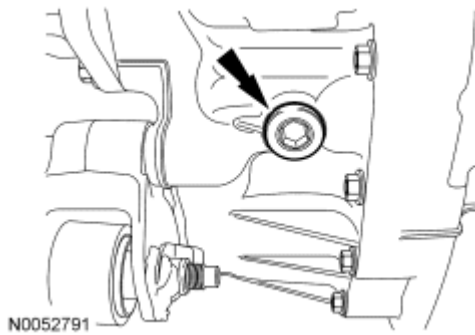


N0052791

**Fig. 163: Identifying Transmission Drain Plug**  
Courtesy of FORD MOTOR CO.

22. If removed, install the transmission fluid drain plug.

- Tighten to 47 Nm (35 lb-ft).

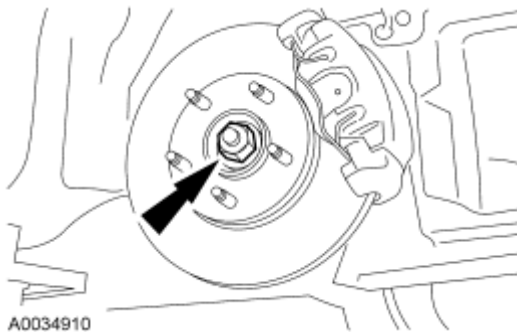


**Fig. 164: Identifying Transmission Drain Plug**  
Courtesy of FORD MOTOR CO.

23. Remove the LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.

**All-Wheel Drive (AWD) vehicles**

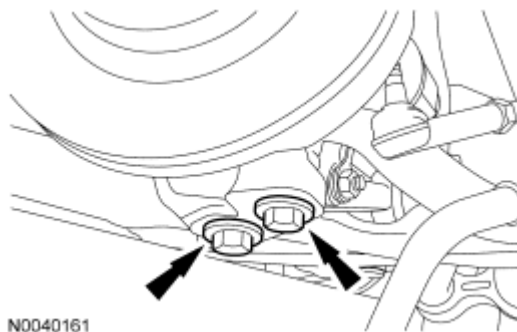
24. Remove and discard the front wheel hub nut.



**Fig. 165: Locating Front Wheel Hub Nut**  
Courtesy of FORD MOTOR CO.

**All vehicles**

25. Remove the RH lower control arm nuts.

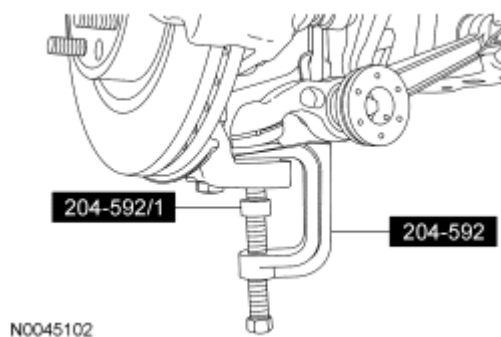


**Fig. 166: Locating Front And Rear Lower Control Arm Nuts**  
 Courtesy of FORD MOTOR CO.

**NOTE:** When the lower ball joint is separated from the wheel knuckle, the lower arm may strike the outer constant velocity (CV) joint boot with enough force to damage the boot clamp. This will result in a loss of grease from the outer CV joint. Place a block of wood, or similar item, between the lower arm and the outer CV joint to prevent the lower arm from striking the outer CV joint.

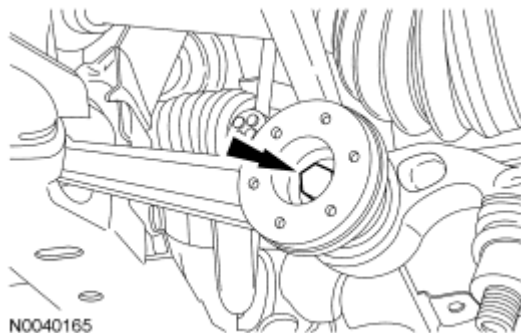
**NOTE:** Once pressure is applied to the ball joint with the Ball Joint Separator and Adapter, it may be necessary to tap the wheel knuckle at the ball joint area to separate the ball joint from the wheel knuckle.

26. Using the Ball Joint Separator and Adapter, separate the 2 lower ball joints from the wheel knuckle and remove the wheel knuckle.



**Fig. 167: Identifying Special Tool 204-592/1 And 204-592**  
 Courtesy of FORD MOTOR CO.

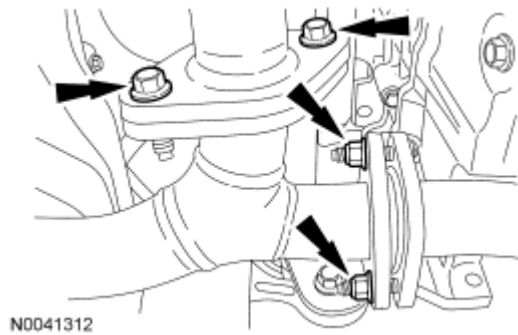
27. Remove the bolt connecting the RH damper fork to the lower control arm.



**Fig. 168: Locating Damper Fork Bolt**  
 Courtesy of FORD MOTOR CO.

**NOTE:** Front Wheel Drive (FWD) shown, All-Wheel Drive (AWD) similar.

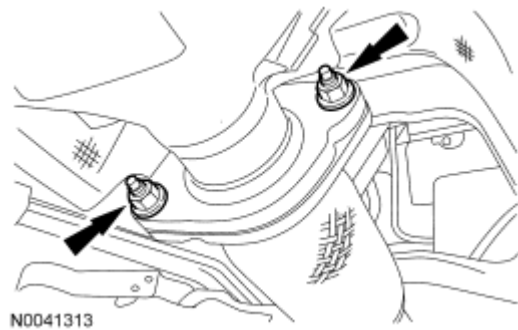
28. Remove the 2 Y-pipe bolts and nuts.



**Fig. 169: Locating Y-Pipe Bolts And Nuts**  
Courtesy of FORD MOTOR CO.

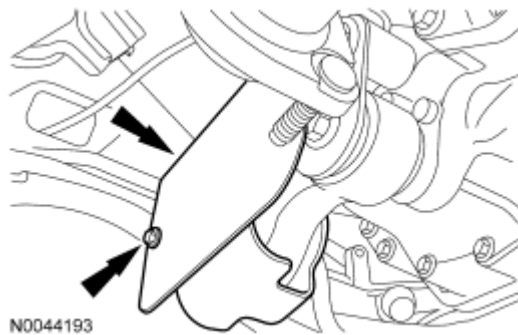
**NOTE:** FWD shown, AWD similar.

29. Remove the flexpipe nuts and the Y-pipe assembly.



**Fig. 170: Locating Flex Pipe Nuts**  
Courtesy of FORD MOTOR CO.

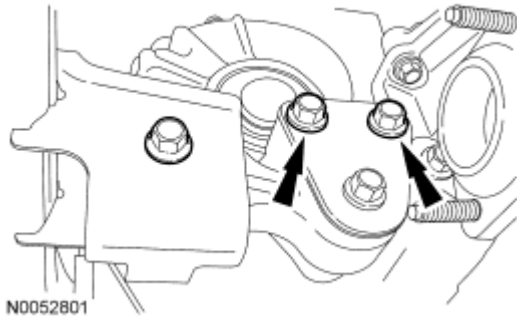
30. If equipped, remove the 2 bolts and the roll restrictor heat shield.



**Fig. 171: Locating Heat Shield And Bolts**  
Courtesy of FORD MOTOR CO.

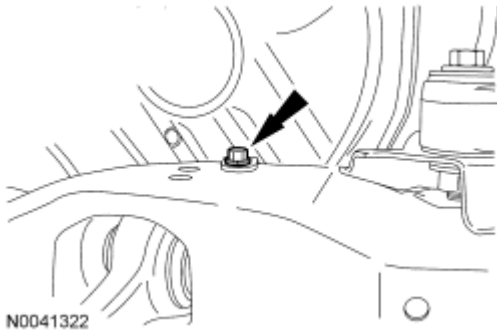
**NOTE: FWD shown, AWD similar.**

31. Remove the 2 bolts from the engine roll restrictor bracket.



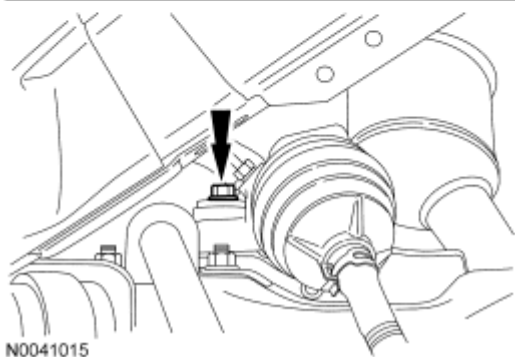
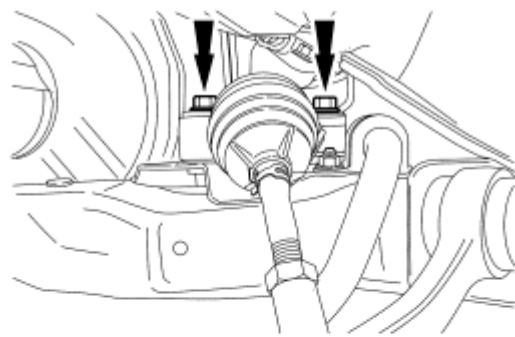
**Fig. 172: Locating Engine Roll Restrictor Bracket Bolts**  
Courtesy of FORD MOTOR CO.

32. Remove the bolts and position the power steering cooler tube aside.



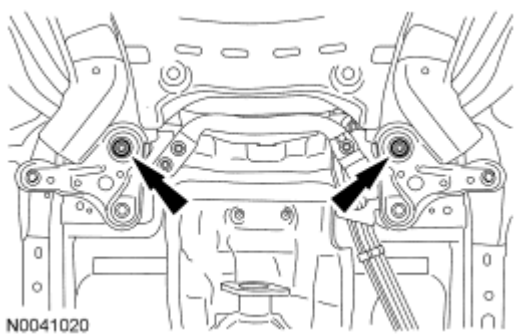
**Fig. 173: Locating Power Steering Cooler Tube Bolts**  
Courtesy of FORD MOTOR CO.

33. Remove the 3 steering gear bolts and position the steering gear aside with mechanic's wire.



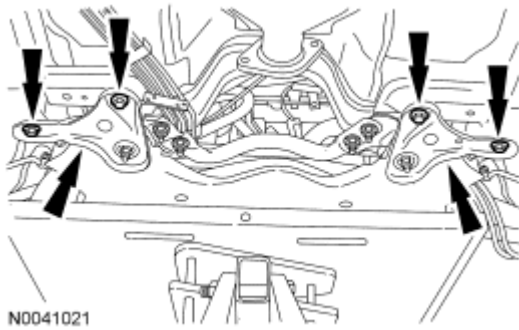
**Fig. 174: Locating Steering Gear Bolts**  
Courtesy of FORD MOTOR CO.

34. Position a suitable drivetrain lift table under the subframe.
35. Remove the 2 rear subframe nuts.



**Fig. 175: Locating Rear Subframe Nuts**  
Courtesy of FORD MOTOR CO.

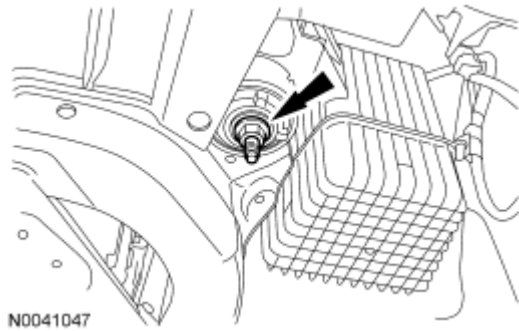
36. Remove the 4 bolts and the 2 subframe support brackets.



**Fig. 176: Locating Subframe Support Brackets And Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** LH shown, RH similar.

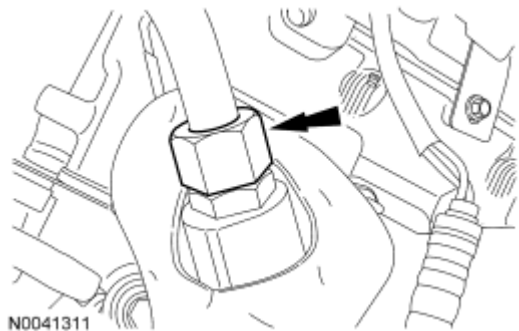
37. Remove the 2 front subframe nuts and remove the subframe.



**Fig. 177: Locating Front Subframe Nuts**  
Courtesy of FORD MOTOR CO.

**NOTE:** FWD shown, AWD similar.

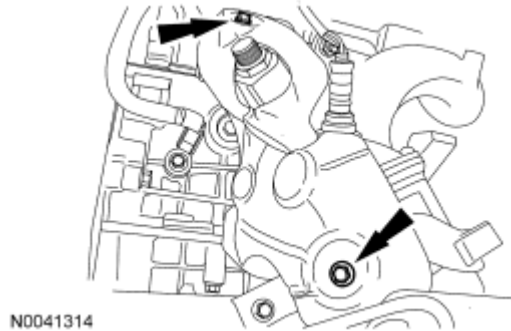
38. Loosen the EGR tube nut at the RH exhaust manifold and remove the EGR tube.



**Fig. 178: Locating EGR Tube Nut At RH Exhaust Manifold**  
Courtesy of FORD MOTOR CO.

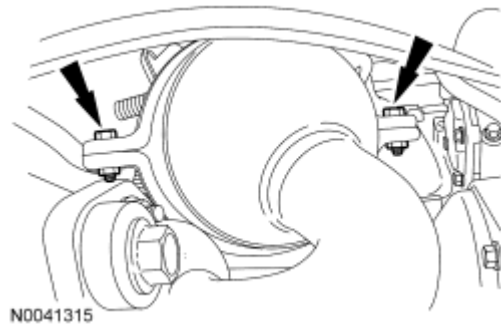
**Front Wheel Drive (FWD) vehicles**

39. Remove the 2 bolts and the RH exhaust manifold heat shield.



**Fig. 179: Locating RH Exhaust Manifold Heat Shield And Bolts**  
Courtesy of FORD MOTOR CO.

40. Remove the 2 bolts and the catalytic converter band clamp.



**Fig. 180: Locating Catalytic Converter Band Clamp And Bolts**  
Courtesy of FORD MOTOR CO.

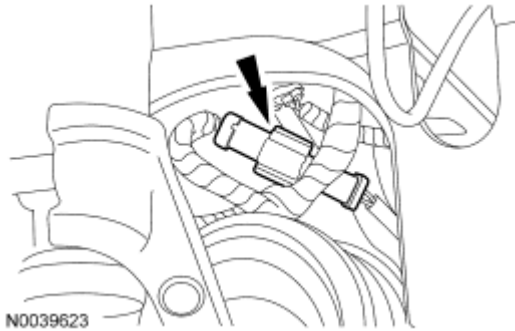
41. Remove the 2 bolts and the catalytic converter-to-engine block bracket.



**Fig. 181: Locating Catalytic Converter-To-Engine Block Bracket And Bolts**  
Courtesy of FORD MOTOR CO.

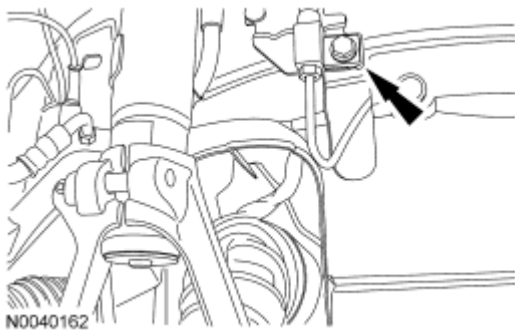
42. Disconnect the Heated Oxygen Sensor (HO2S) electrical connector from the RH halfshaft bearing

support bracket.



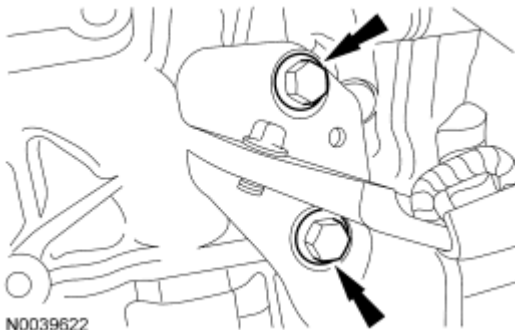
**Fig. 182: Locating Heated Oxygen Sensor (HO2S) Electrical Connector**  
Courtesy of FORD MOTOR CO.

43. Remove the bolt retaining the brake caliper hose.



**Fig. 183: Locating Brake Caliper Hose Bolt**  
Courtesy of FORD MOTOR CO.

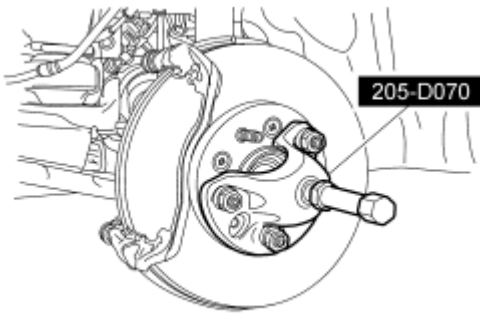
44. Remove the 2 bolts and remove the RH halfshaft from the transaxle and position it aside with mechanic's wire.



**Fig. 184: Locating RH Halfshaft Carrier Bearing Bracket Bolts**  
Courtesy of FORD MOTOR CO.

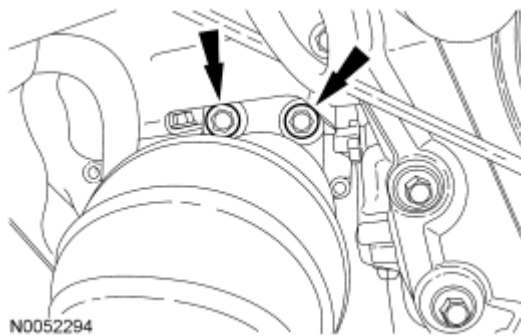
**AWD vehicles**

45. Using the Front Wheel Hub Remover, separate the halfshaft from the wheel hub.



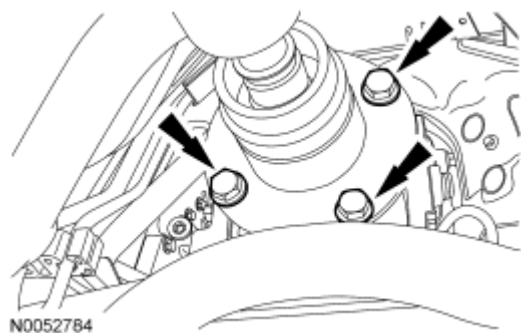
**Fig. 185: Separating Halfshaft From Wheel Hub Using Special Tool (205-D070)**  
Courtesy of FORD MOTOR CO.

46. Remove the 2 bolts and the RH halfshaft.



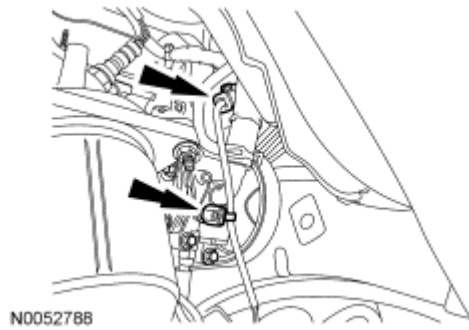
**Fig. 186: Locating RH Halfshaft Bearing Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

47. Index the driveshaft, remove the 4 bolts from the driveshaft and position the driveshaft aside.



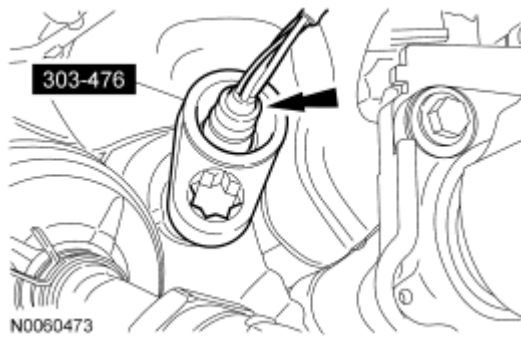
**Fig. 187: Identifying Drive Shaft Bolts**  
Courtesy of FORD MOTOR CO.

48. Disconnect the RH catalyst monitor sensor electrical connector and detach the wiring retainer.



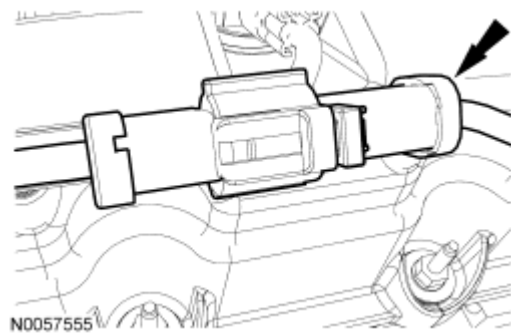
**Fig. 188: Locating RH Catalyst Monitor Sensor Electrical Connector & Wiring Retainer**  
Courtesy of FORD MOTOR CO.

49. Using the Exhaust Gas Oxygen Sensor Socket, remove the RH catalyst monitor sensor.



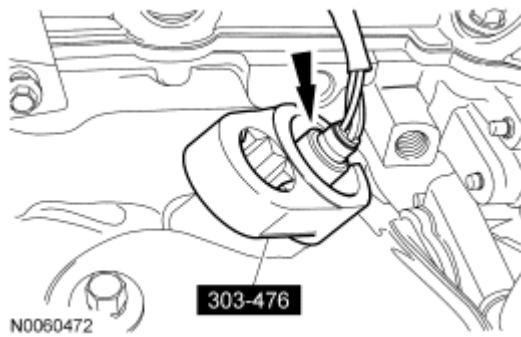
**Fig. 189: Identifying RH Catalyst Monitor Sensor & Special Tool (303-476)**  
Courtesy of FORD MOTOR CO.

50. Disconnect the RH HO2S electrical connector.



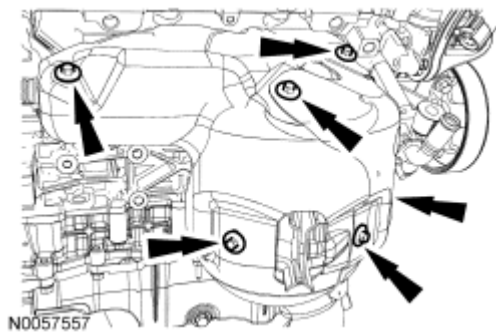
**Fig. 190: Identifying RH HO2S Electrical Connector**  
Courtesy of FORD MOTOR CO.

51. Using the Exhaust Gas Oxygen Sensor Socket, remove the RH HO2S.



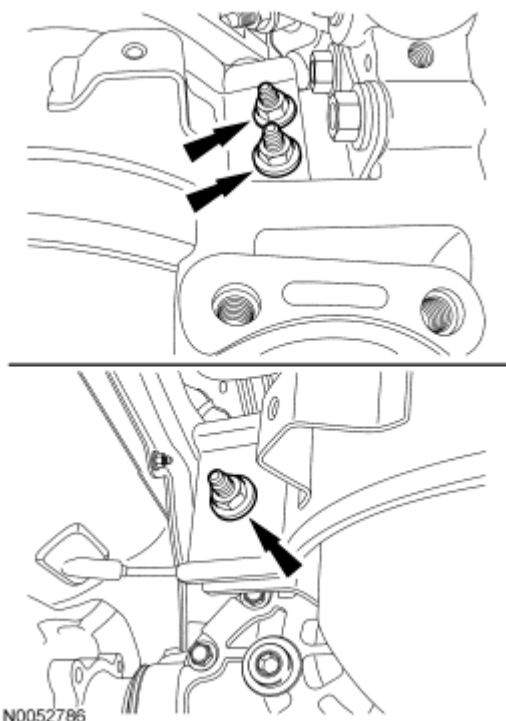
**Fig. 191: Identifying RH HO2S & Special Tool (303-476)**  
Courtesy of FORD MOTOR CO.

52. Remove the 6 bolts and the RH exhaust heat shield.



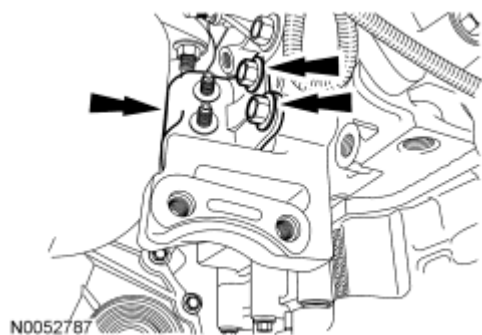
**Fig. 192: Locating RH Exhaust Heat Shield Bolts**  
Courtesy of FORD MOTOR CO.

53. Remove the 3 nuts and the catalytic converter band clamp RH half.



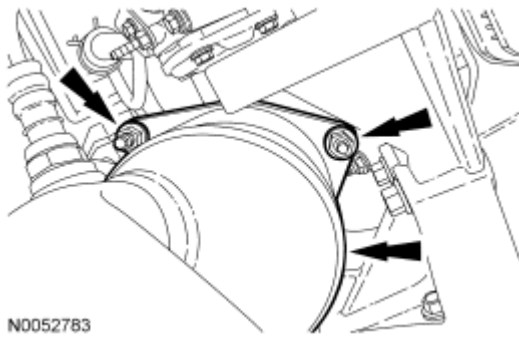
**Fig. 193: Locating RH Exhaust Heat Shield Bracket Nuts - Inboard Half**  
Courtesy of FORD MOTOR CO.

54. Remove the 2 bolts and the catalytic converter band clamp LH half.



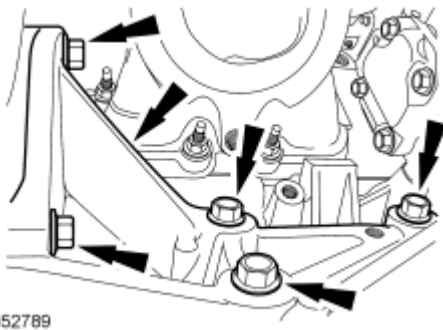
**Fig. 194: Locating Catalytic Converter Band Clamp LH Half Nuts**  
Courtesy of FORD MOTOR CO.

55. Remove the nuts and the RH catalytic converter.



**Fig. 195: Locating RH Catalytic Converter Nuts**  
Courtesy of FORD MOTOR CO.

56. Remove the 5 bolts and the Power Transfer Unit (PTU) support bracket.

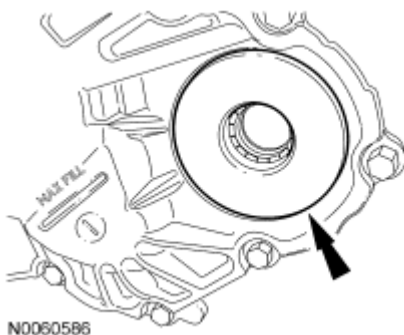


**Fig. 196: Identifying PTU Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** A new halfshaft seal must be installed anytime the RH halfshaft is removed.

**NOTE:** The seal deflector will be damaged during removal. Be careful not to damage the cover seal directly behind the seal deflector.

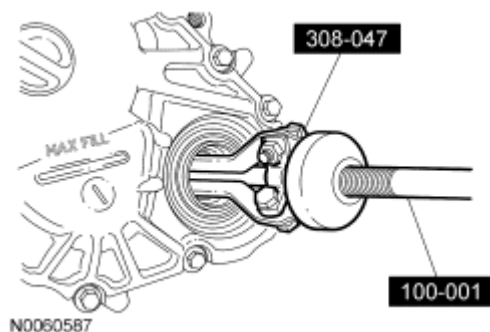
57. Remove the seal deflector.



**Fig. 197: Identifying Seal Deflector**

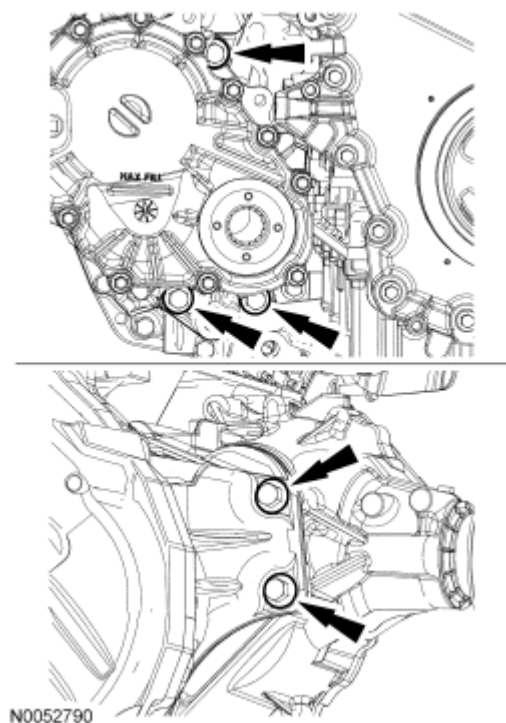
Courtesy of FORD MOTOR CO.

58. Using the Bearing Cup Puller and Slide Hammer, remove the halfshaft seal from the PTU.



**Fig. 198: Removing Intermediate Shaft Seal Using Special Tools (100-001) & (308-047)**  
Courtesy of FORD MOTOR CO.

59. Remove the 5 bolts and the PTU.

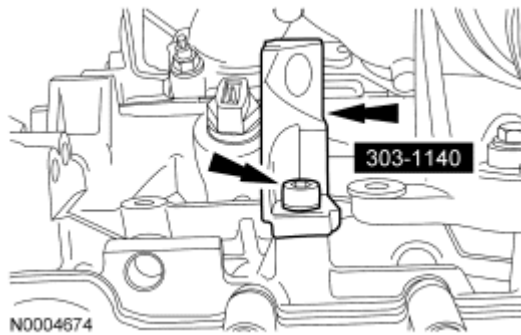


**Fig. 199: Locating PTU Bolts**  
Courtesy of FORD MOTOR CO.

All vehicles

**NOTE:** When installing the Engine Lifting Bracket Set, it will be easier to loosely install the upper bolt first, then install the lower bolt.

60. Install the lower half of the Engine Lifting Bracket Set.



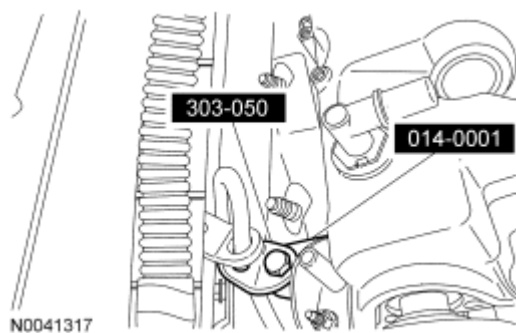
**Fig. 200: Identifying Lower Half Of Lifting Hook**  
Courtesy of FORD MOTOR CO.

61. Install the upper half of the Engine Lifting Bracket Set.



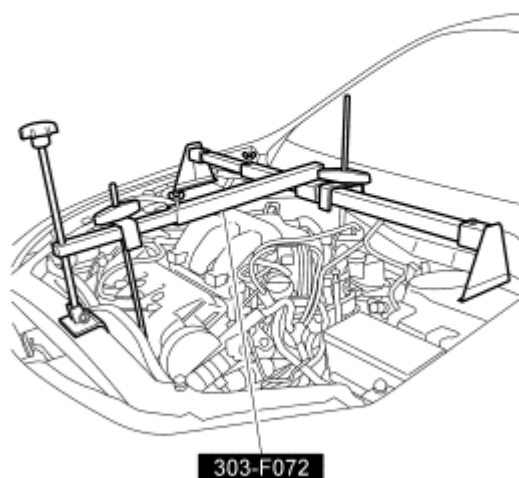
**Fig. 201: Identifying Upper Half Of Lifting Hook**  
Courtesy of FORD MOTOR CO.

62. Install the Engine Lifting Bracket and Universal Adapter Bracket "L" hook on the LH side of the engine.



**Fig. 202: Identifying Universal Lifting Brackets**  
Courtesy of FORD MOTOR CO.

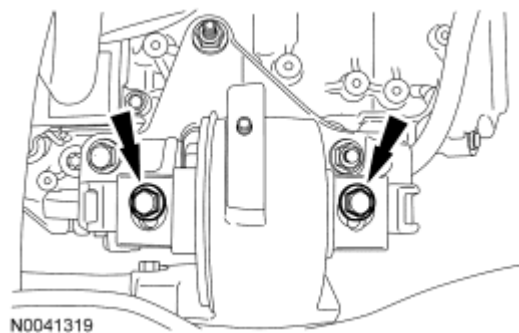
63. Install the Engine Support Bar to support the engine.



N0082626

**Fig. 203: Installing Engine Support Bar To Support Engine**  
Courtesy of FORD MOTOR CO.

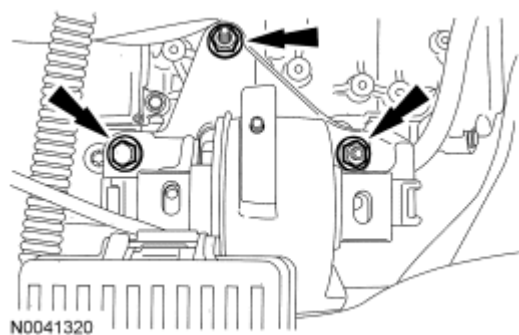
64. Remove the 2 bolts from the transmission insulator.



N0041319

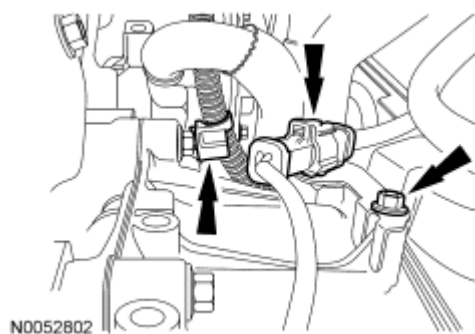
**Fig. 204: Locating Transaxle Insulator Bolts**  
Courtesy of FORD MOTOR CO.

65. Lower the transaxle and remove the 2 nuts and the bolt and remove the transaxle support insulator bracket.



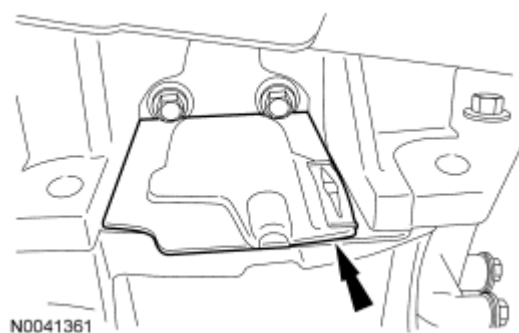
**Fig. 205: Locating Transaxle Insulator Bracket Nuts And Bolt**  
Courtesy of FORD MOTOR CO.

66. Remove the HO2S bracket bolt and disconnect the wiring harness fastener.



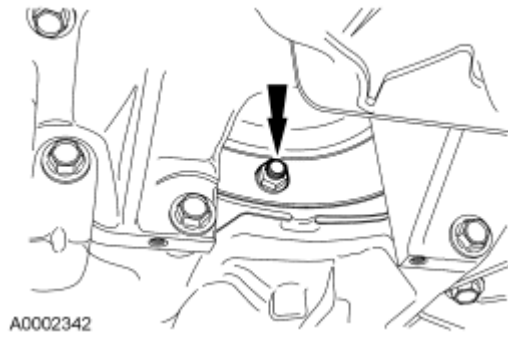
**Fig. 206: Identifying Heated Oxygen Sensor (HO2S) Bracket & Stud Bolt**  
Courtesy of FORD MOTOR CO.

67. Remove the inspection cover.



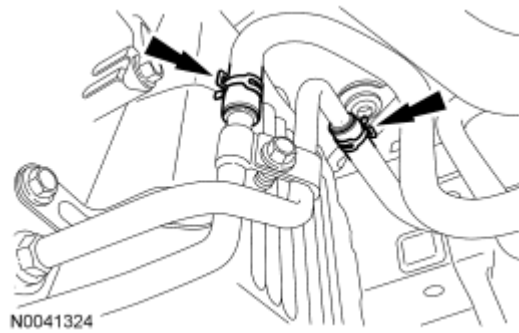
**Fig. 207: Identifying Inspection Cover**  
Courtesy of FORD MOTOR CO.

68. Remove and discard the 3 torque converter nuts.



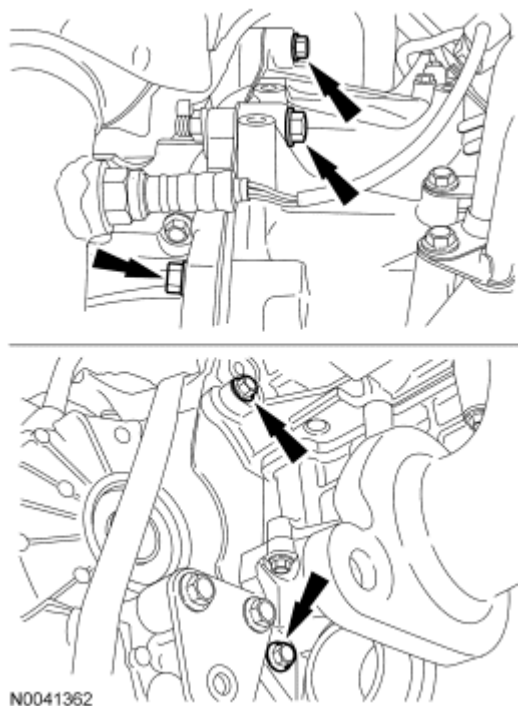
**Fig. 208: Locating Torque Converter Nuts**  
Courtesy of FORD MOTOR CO.

69. Disconnect the transmission fluid cooler hoses.



**Fig. 209: Locating Transmission Fluid Cooler Hoses**  
Courtesy of FORD MOTOR CO.

70. Position a suitable high-lift transmission jack under the transaxle.  
71. Remove the 5 torque converter housing bolts and remove the transmission.

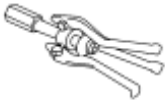


**Fig. 210: Locating Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

72. If installing a new transaxle, the transmission fluid cooler will need to be backflushed and cleaned. Carry out transmission fluid cooler backflushing and cleaning. For additional information, refer to **Transmission Fluid Cooler - Backflushing and Cleaning**.

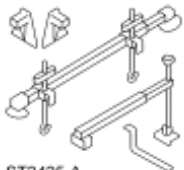
## TRANSAXLE - 3.5L

### Special Tools

| Illustration                                                                                    | Tool Name              | Tool Number           |
|-------------------------------------------------------------------------------------------------|------------------------|-----------------------|
| <br>ST2646-A | Adapter for 204-592    | 204-592/1             |
| <br>ST1200-A | Bearing Cup Puller     | 308-047 (T77F-1102-A) |
|                                                                                                 | Engine Lifting Bracket | 303-1245              |

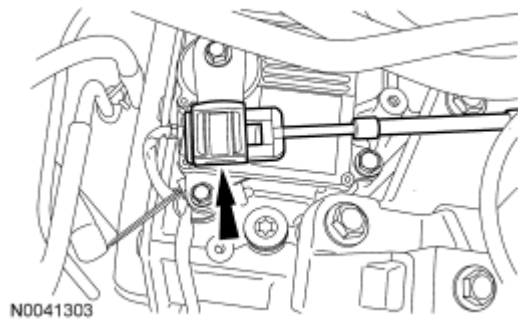
## 2008 Ford Fusion S

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ

|                                                                                                     |                          |                                      |
|-----------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------|
|  <p>ST2976A</p>    |                          |                                      |
|  <p>ST2272-A</p>   | Remover, Front Wheel Hub | 205-D070 (D93P-1175-B) or equivalent |
|  <p>ST2945-A</p>   | Separator, Ball Joint    | 204-592                              |
|  <p>ST1185-A</p>   | Slide Hammer             | 100-001 (T50T-100-A)                 |
|  <p>ST2977-A</p> | Spreader Bar             | 303-1246                             |
|  <p>ST2425-A</p> | Support Bar, Engine      | 303-F072                             |

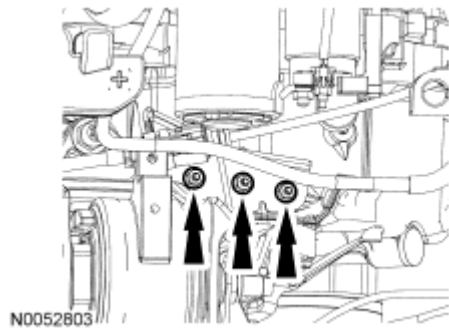
### All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the battery and battery tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the air cleaner and the outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 3.5L** article.
4. Remove the upper intake manifold. For additional information, refer to **ENGINE - 3.5L** article.
5. Disconnect the selector lever cable end.



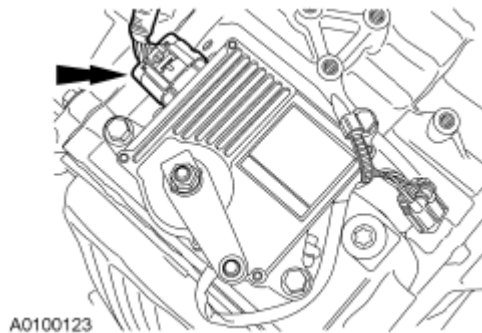
**Fig. 211: Locating Selector Lever Cable End**  
Courtesy of FORD MOTOR CO.

6. Remove the 2 bolts and the nut for the selector lever cable bracket and position the cable and bracket aside.



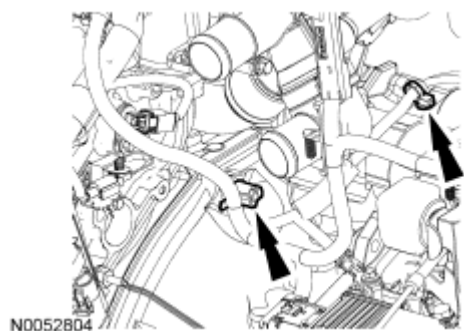
**Fig. 212: Identifying Selector Lever Cable Bracket Bolts & Nuts**  
Courtesy of FORD MOTOR CO.

7. Disconnect the wire harness from the Transmission Control Module (TCM).



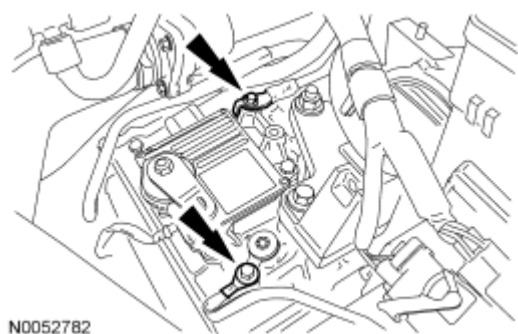
**Fig. 213: Identifying Transmission Control Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

8. Disconnect the wiring harness fasteners from the torque converter housing stud bolt and the starter motor.



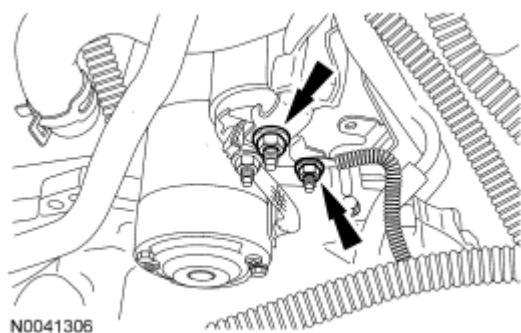
**Fig. 214: Identifying Wiring Harness Fasteners & Torque Converter Housing Stud Bolt**  
Courtesy of FORD MOTOR CO.

9. Remove the 2 ground strap bolts and position aside the ground straps.



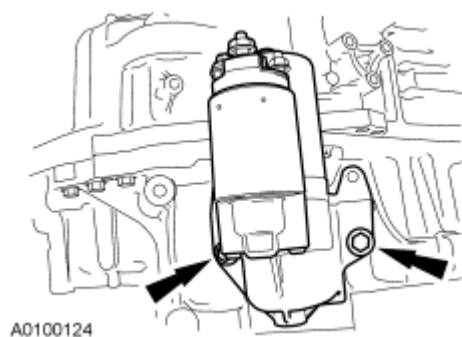
**Fig. 215: Identifying Ground Straps & Ground Strap Bolts**  
Courtesy of FORD MOTOR CO.

10. Position the boot back and remove the starter terminals from the starter.



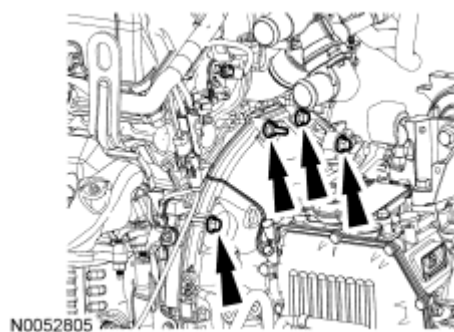
**Fig. 216: Locating Bolts On Starter Terminals**  
Courtesy of FORD MOTOR CO.

11. Remove the 2 bolts and the starter.



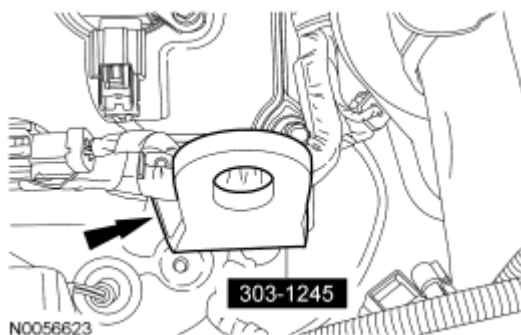
**Fig. 217: Locating Starter Bolts**  
Courtesy of FORD MOTOR CO.

12. Remove the 4 upper torque converter housing bolts.



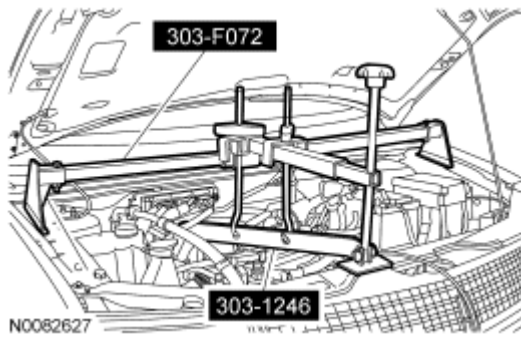
**Fig. 218: Identifying Upper Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

13. Install the Engine Lifting Bracket on the LH cylinder head.



**Fig. 219: Special Tool (303-1245) On LH Cylinder Head**  
Courtesy of FORD MOTOR CO.

14. Install the Engine Support Bar and Spreader Bar to support the engine.



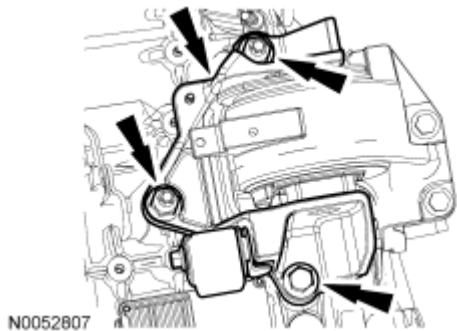
**Fig. 220: Installing Engine Support Bar & Spreader Bar To Support Engine**  
Courtesy of FORD MOTOR CO.

15. Remove the transaxle support insulator through bolt.



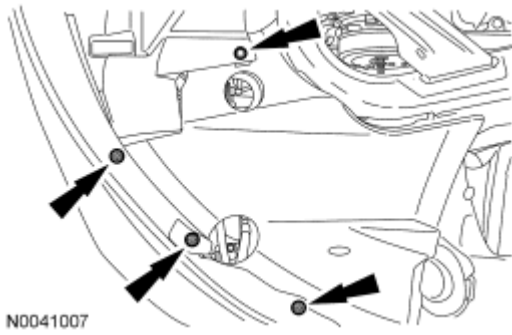
**Fig. 221: Identifying Transaxle Support Insulator Through Bolt**  
Courtesy of FORD MOTOR CO.

16. Using the Engine Support Bar, lower the transaxle and remove the 2 transaxle support insulator bracket nuts, the bolt and the bracket.



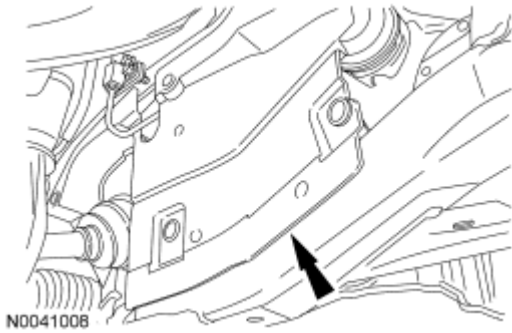
**Fig. 222: Locating Transaxle Support Insulator Bracket Nuts & Bolt**  
Courtesy of FORD MOTOR CO.

17. Remove the 4 screws and position the RH fender splash shield aside.



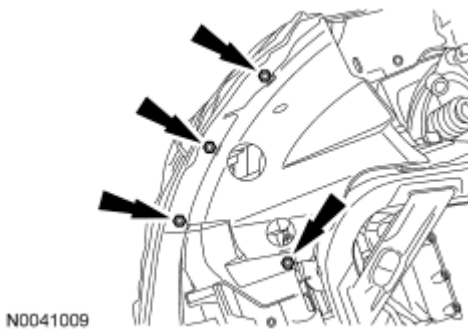
**Fig. 223: Locating RH Fender Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

18. Remove the 6 pin-type retainers and remove the RH front structure to subframe splash shield.



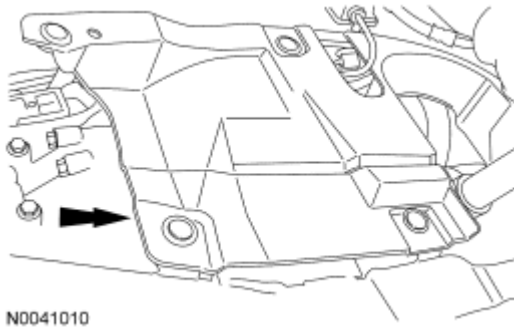
**Fig. 224: Locating RH Front Structure-To-Subframe Splash Shield**  
Courtesy of FORD MOTOR CO.

19. Remove the 4 screws and position the LH fender splash shield aside.



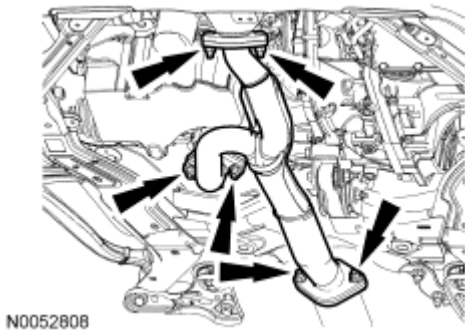
**Fig. 225: Locating LH Fender Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

20. Remove the pin-type retainers and remove the LH front structure-to-subframe splash shield.



**Fig. 226: Locating LH Front Structure-To-Subframe Splash Shield**  
Courtesy of FORD MOTOR CO.

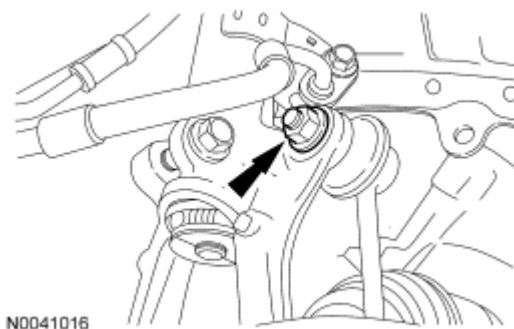
21. Remove the 6 Y-pipe nuts and the Y-pipe assembly.



**Fig. 227: Locating Y-Pipe Nuts & Y-Pipe Assembly**  
Courtesy of FORD MOTOR CO.

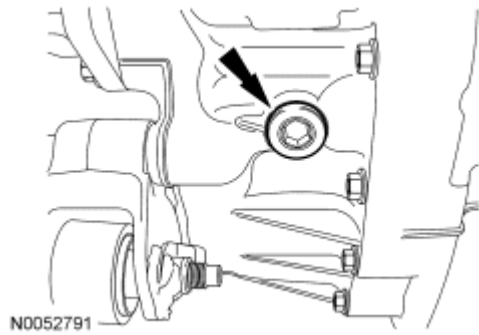
**NOTE:** LH shown, RH similar.

22. Remove the nuts and separate the sway bar links from the struts.



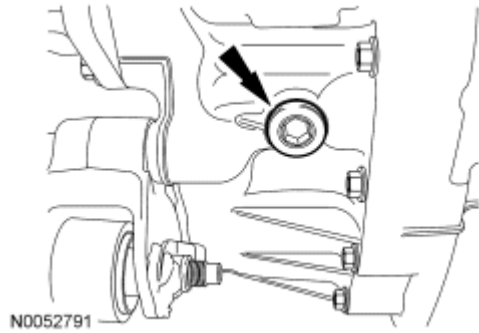
**Fig. 228: Locating Sway Bar Links Nut**  
Courtesy of FORD MOTOR CO.

23. If a transaxle exchange or overhaul is required, the transmission fluid must be drained.
- Remove the transmission drain plug and allow the transmission fluid to drain.



**Fig. 229: Identifying Transmission Drain Plug**  
Courtesy of FORD MOTOR CO.

24. If removed, install the transmission fluid drain plug.
- Tighten to 47 Nm (35 lb-ft).

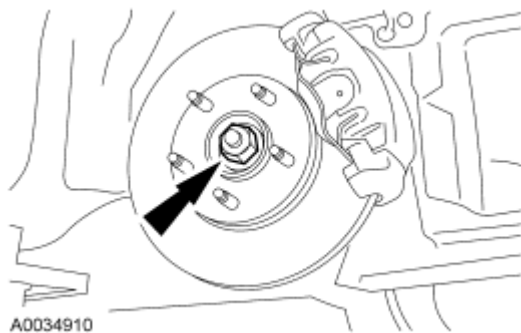


**Fig. 230: Identifying Transmission Drain Plug**  
Courtesy of FORD MOTOR CO.

25. Remove the LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.

**All-Wheel Drive (AWD) vehicles**

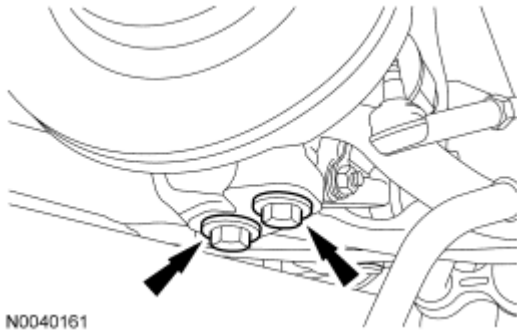
26. Remove and discard the front wheel hub nut.



**Fig. 231: Locating Front Wheel Hub Nut**  
Courtesy of FORD MOTOR CO.

**All vehicles**

27. Remove the RH lower control arm nuts.

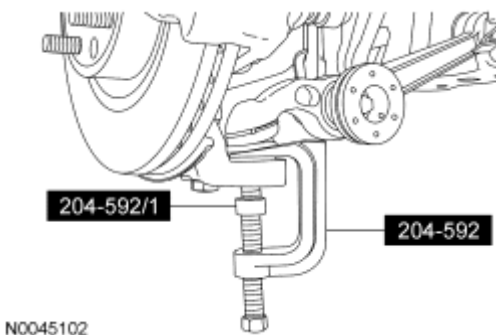


**Fig. 232: Locating Front And Rear Lower Control Arm Nuts**  
Courtesy of FORD MOTOR CO.

**NOTE:** When the lower ball joint is separated from the wheel knuckle, the lower arm may strike the outer constant velocity (CV) joint boot with enough force to damage the boot clamp. This will result in a loss of grease from the outer CV joint. Place a block of wood, or similar item, between the lower arm and the outer CV joint to prevent the lower arm from striking the outer CV joint.

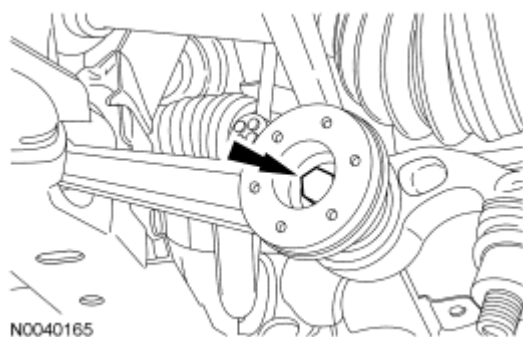
**NOTE:** Once pressure is applied to the ball joint with the Ball Joint Separator and Adapter, it may be necessary to tap the wheel knuckle at the ball joint area to separate the ball joint from the wheel knuckle.

28. Using the Ball Joint Separator and Adapter, separate the 2 lower ball joints from the wheel knuckle and remove the wheel knuckle.



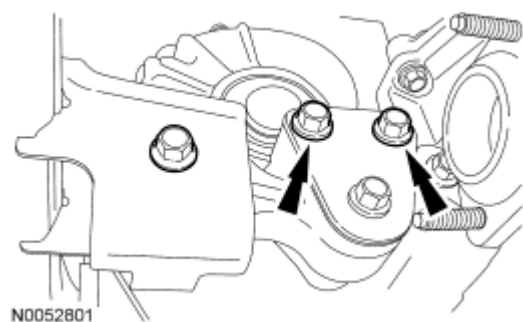
**Fig. 233: Identifying Special Tool 204-592/1 And 204-592**  
Courtesy of FORD MOTOR CO.

29. Remove the bolt connecting the RH damper fork to the lower control arm.



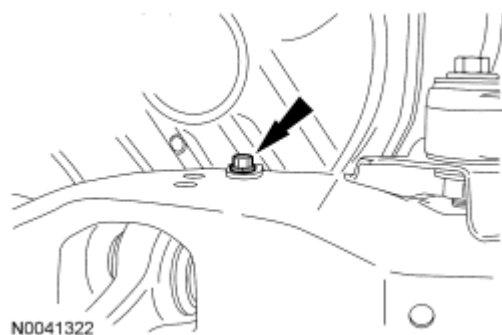
**Fig. 234: Locating Damper Fork Bolt**  
Courtesy of FORD MOTOR CO.

30. Remove the 2 engine roll restrictor bracket bolts.



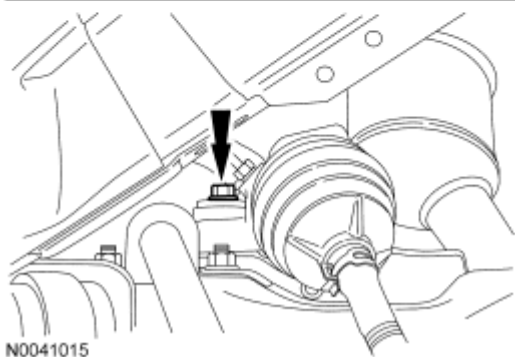
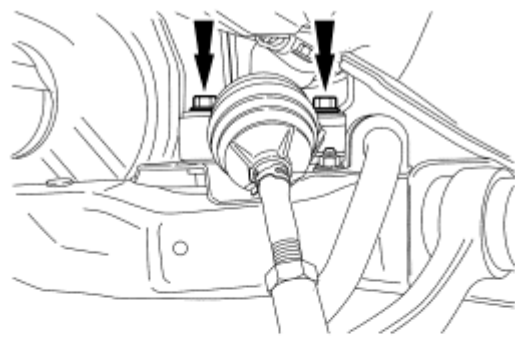
**Fig. 235: Locating Engine Roll Restrictor Bracket Bolts**  
Courtesy of FORD MOTOR CO.

31. Remove the bolts and position the power steering cooler tube aside.



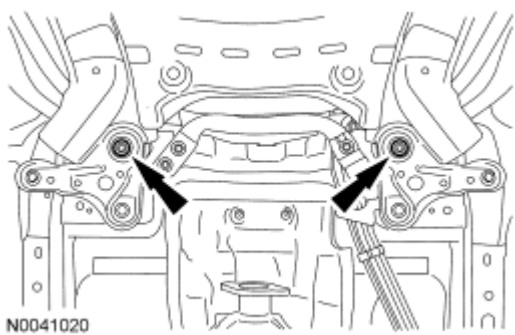
**Fig. 236: Locating Power Steering Cooler Tube Bolts**  
Courtesy of FORD MOTOR CO.

32. Remove the 3 steering gear bolts and position the steering gear aside with mechanic's wire.



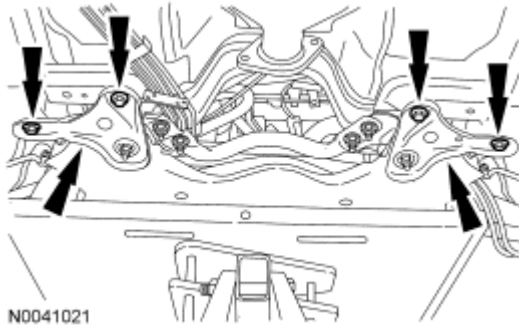
**Fig. 237: Locating Steering Gear Bolts**  
Courtesy of FORD MOTOR CO.

33. Position a suitable powertrain lift table under the subframe.
34. Remove the 2 rear subframe nuts.



**Fig. 238: Locating Rear Subframe Nuts**  
Courtesy of FORD MOTOR CO.

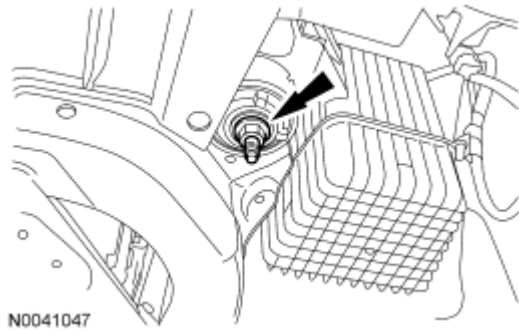
35. Remove the 4 bolts and the 2 subframe support brackets.



**Fig. 239: Locating Subframe Support Brackets And Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** LH shown, RH similar.

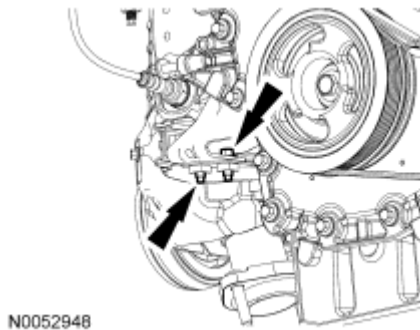
36. Remove the 2 front subframe nuts and remove the subframe.



**Fig. 240: Locating Front Subframe Nuts**  
Courtesy of FORD MOTOR CO.

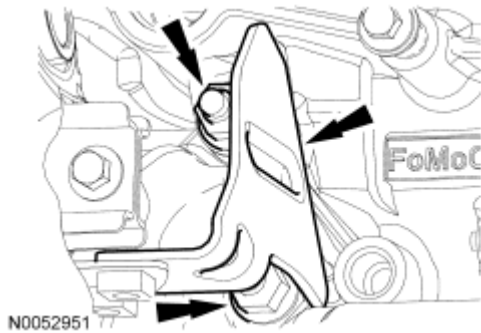
**Front Wheel Drive (FWD) vehicles**

37. Remove the 2 catalytic converter bracket bolts.



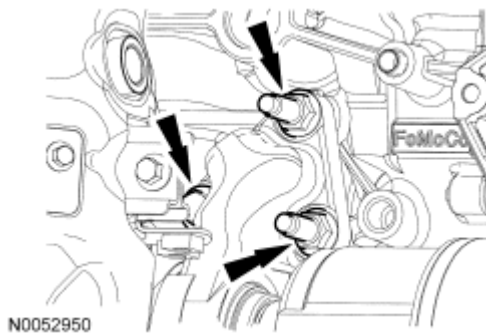
**Fig. 241: Identifying Catalytic Converter Bracket Bolts**  
Courtesy of FORD MOTOR CO.

38. Remove the 2 nuts and remove the catalytic converter support bracket.



**Fig. 242: Identifying Catalytic Converter Support Bracket & Nuts**  
Courtesy of FORD MOTOR CO.

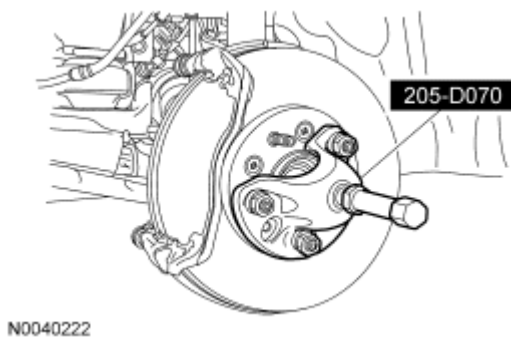
39. Remove the 3 bolts and position the RH halfshaft aside.



**Fig. 243: Identifying Intermediate Shaft Bearing Support Bracket & Nuts**  
Courtesy of FORD MOTOR CO.

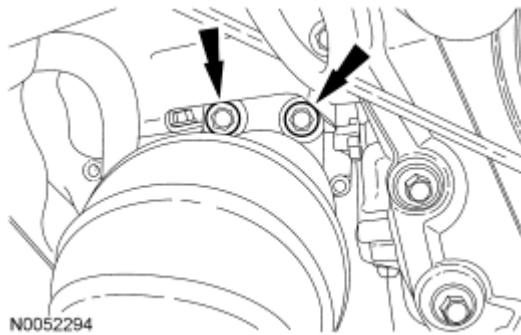
#### **AWD vehicles**

40. Using the Front Wheel Hub Remover, press the halfshaft out of the wheel hub.



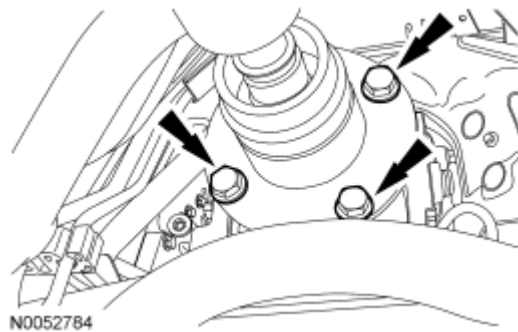
**Fig. 244: Separating Halfshaft From Wheel Hub Using Special Tool (205-D070)**  
Courtesy of FORD MOTOR CO.

41. Remove the 2 bolts and the RH halfshaft.



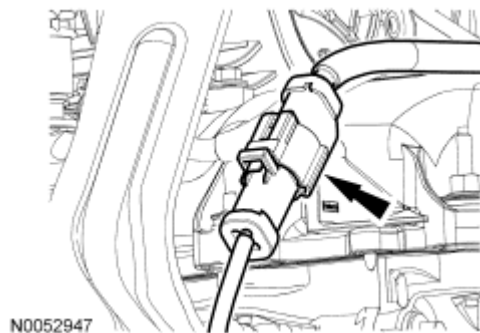
**Fig. 245: Locating RH Halfshaft Bearing Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

42. Index the driveshaft, remove the 4 bolts and position the driveshaft aside.



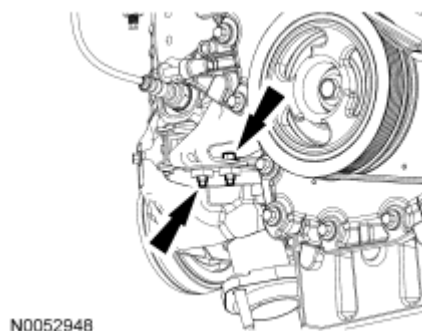
**Fig. 246: Identifying Drive Shaft Bolts**  
Courtesy of FORD MOTOR CO.

43. Disconnect the RH catalyst monitor electrical connector.



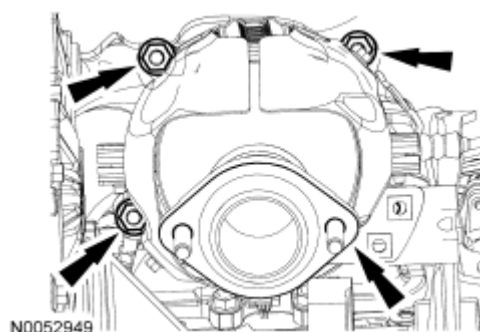
**Fig. 247: Locating RH Catalyst Monitor Electrical Connector**  
Courtesy of FORD MOTOR CO.

44. Remove the 2 catalytic converter bracket bolts.



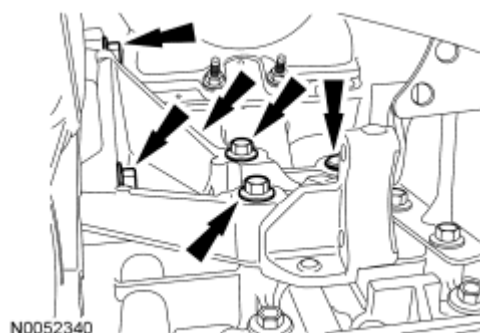
**Fig. 248: Identifying Catalytic Converter Bracket Bolts**  
Courtesy of FORD MOTOR CO.

45. Remove the 4 nuts and the RH catalytic converter.



**Fig. 249: Locating RH Catalytic Converter Nuts**  
Courtesy of FORD MOTOR CO.

46. Remove the 5 bolts and the power transfer unit PTU support bracket.



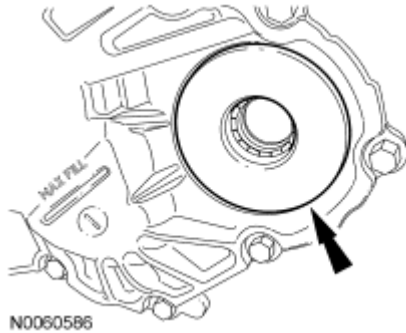
**Fig. 250: Locating Power Transfer Unit (PTU) Support Bracket & Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** A new halfshaft seal must be installed anytime the RH halfshaft is removed.

**NOTE:** The seal deflector will be damaged during removal. Be careful not to

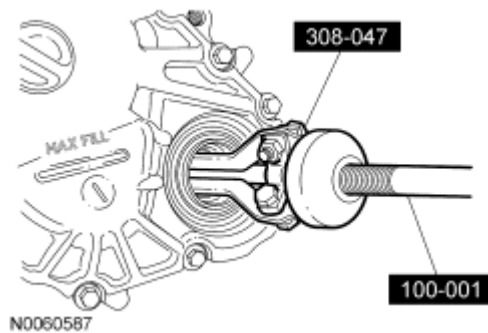
**damage the cover seal directly behind the seal deflector.**

47. Remove the seal deflector.



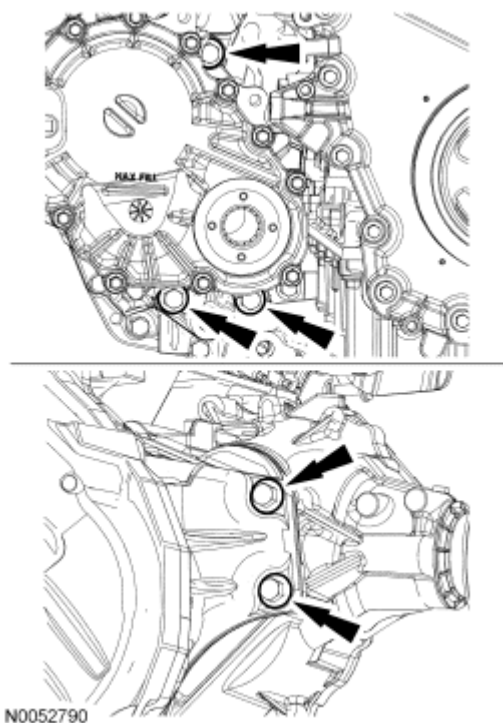
**Fig. 251: Identifying Seal Deflector**  
Courtesy of FORD MOTOR CO.

48. Using the Bearing Cup Puller and Slide Hammer, remove the halfshaft seal from the PTU.



**Fig. 252: Removing Intermediate Shaft Seal Using Special Tools (100-001) & (308-047)**  
Courtesy of FORD MOTOR CO.

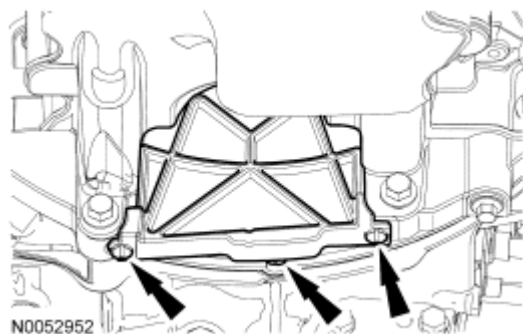
49. Remove the 5 bolts and the PTU.



**Fig. 253: Locating PTU Bolts**  
Courtesy of FORD MOTOR CO.

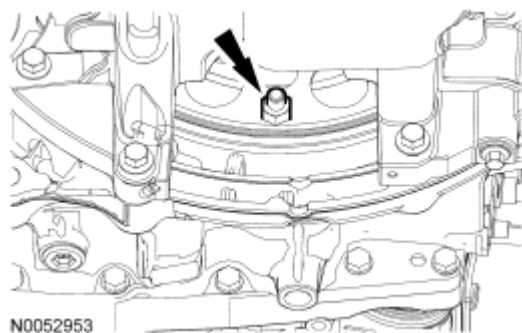
**All vehicles**

50. Remove the 2 fasteners and the inspection cover.



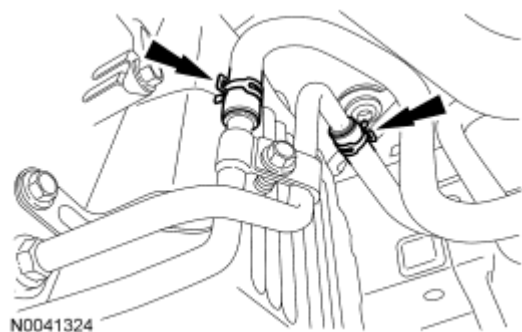
**Fig. 254: Identifying Inspection Cover & Fasteners**  
Courtesy of FORD MOTOR CO.

51. Remove and discard the 4 torque converter nuts.



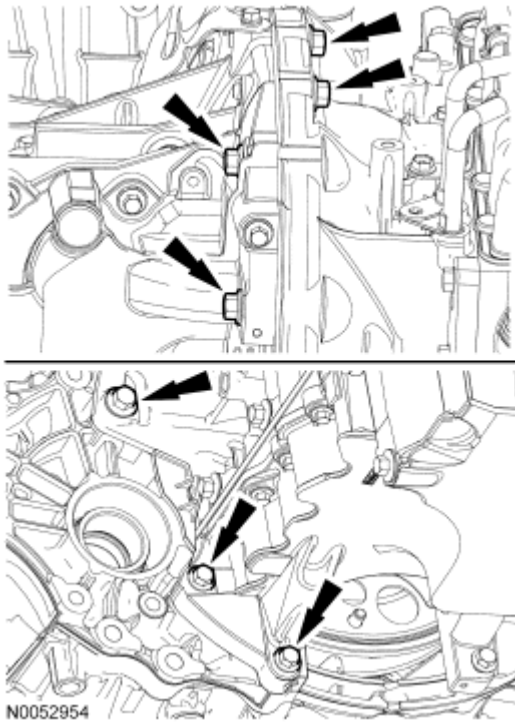
**Fig. 255: Identifying Torque Converter Nuts**  
Courtesy of FORD MOTOR CO.

52. Disconnect the transmission fluid cooler hoses from the transmission fluid cooler tubes.



**Fig. 256: Locating Transmission Fluid Cooler Hoses**  
Courtesy of FORD MOTOR CO.

53. Position a suitable high-lift transmission jack under the transaxle.  
54. Remove the 7 torque converter housing bolts and remove the transaxle.



**Fig. 257: Locating Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

55. If installing a new transaxle, the transmission fluid cooler will need to be backflushed and cleaned. Carry out transmission fluid cooler tube backflushing and cleaning. For additional information, refer to **Transmission Fluid Cooler - Backflushing and Cleaning**.

## DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

### TORQUE CONVERTER HUB SEAL

#### Special Tools

| Illustration                                                                                        | Tool Name                     | Tool Number |
|-----------------------------------------------------------------------------------------------------|-------------------------------|-------------|
|  <p>ST2286-A</p> | Converter Seal Installer      | 307-548     |
|  <p>ST2924-A</p> | Remover, Input Shaft Oil Seal | 308-375     |
|                                                                                                     |                               |             |

## 2008 Ford Fusion S

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ

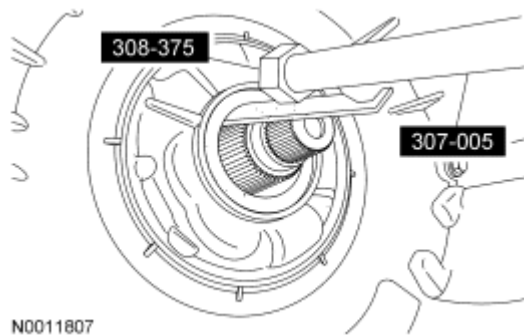
|                                                                                               |              |                     |
|-----------------------------------------------------------------------------------------------|--------------|---------------------|
| <br>ST1187-A | Slide Hammer | 307-005 (T59L100-B) |
|-----------------------------------------------------------------------------------------------|--------------|---------------------|

### Material

| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |

### DISASSEMBLY

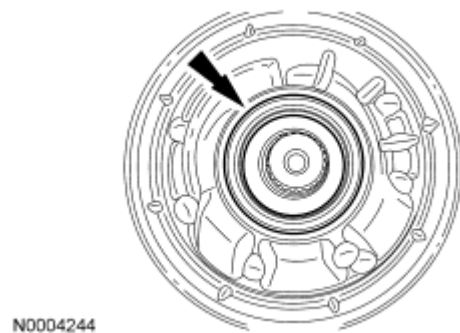
1. Remove the transaxle. For additional information, refer to Transaxle - 3.0L or Transaxle - 3.5L.
2. Remove the torque converter.
3. Using the Input Shaft Oil Seal Remover and Slide Hammer, remove the torque converter hub seal.



**Fig. 258: Removing Torque Converter Hub Seal**  
Courtesy of FORD MOTOR CO.

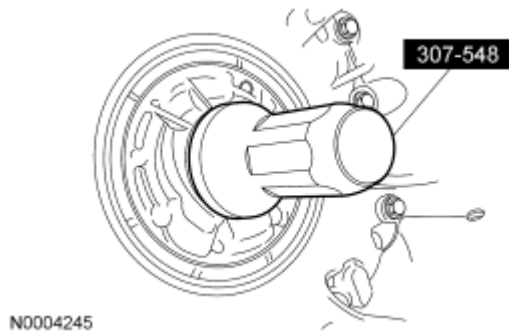
### ASSEMBLY

1. Position the torque converter hub seal in place.



**Fig. 259: Positioning Torque Converter Hub Seal In Place**  
Courtesy of FORD MOTOR CO.

- Using the Converter Seal Installer, install the torque converter hub seal.



**Fig. 260: Installing Torque Converter Hub Seal**  
Courtesy of FORD MOTOR CO.

- Install the torque converter.
- Install the transaxle. For additional information, refer to [Transaxle - 3.0L](#) or [Transaxle - 3.5L](#).

## TORQUE CONVERTER

### Material

| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |

## DISASSEMBLY

- Remove the transaxle. For additional information, refer to [Transaxle - 3.0L](#) or [Transaxle - 3.5L](#).
- Remove the torque converter.

## ASSEMBLY

- Install the torque converter.
- Install the transaxle. For additional information, refer to [Transaxle - 3.0L](#) or [Transaxle - 3.5L](#).

## INSTALLATION

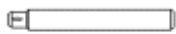
### TRANSAXLE - 3.0L

### Special Tools

| Illustration | Tool Name                  | Tool Number |
|--------------|----------------------------|-------------|
|              | Engine Lifting Bracket Set | 303-1140    |

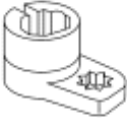
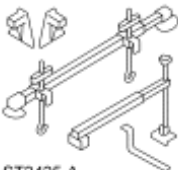
## 2008 Ford Fusion S

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ

|                                                                                                     |                                          |                       |
|-----------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------|
|  <p>ST2873-A</p>   |                                          |                       |
|  <p>ST1255-A</p>   | Handle                                   | 205-153 (T80T-4000-W) |
|  <p>ST1073-A</p>   | Heat Gun                                 | 107-R0300             |
|  <p>ST2138-A</p>   | Installer, Halfshaft                     | 204-161 (T97P-1175-A) |
|  <p>ST2572-A</p> | Installer, Halfshaft Oil Seal            | 308-431               |
|  <p>ST2571-A</p> | Installer, PTU Drive Gear Outer Oil Seal | 308-430               |
|  <p>ST2793-A</p> | Lifting Bracket, Engine                  | 303-050 (T70P-6000)   |
|  <p>ST1568-A</p> | Remover/Installer, Bearing Cup           | 204-038 (T77F-1217-A) |
|                                                                                                     |                                          |                       |

## 2008 Ford Fusion S

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ

|                                                                                                |                                                                                                                              |                       |
|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <br>ST1447-A  | Socket, Exhaust Gas Oxygen Sensor                                                                                            | 303-476 (T94P-9472-A) |
| <br>ST2425-A  | Support Bar, Engine                                                                                                          | 303-F072              |
| <br>ST2743A   | Universal Adapter Bracket                                                                                                    | 014-0001              |
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) with appropriate hardware, or equivalent scan tool |                       |

### Material

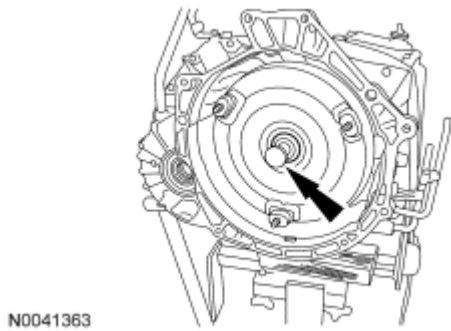
| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |
| Multi-Purpose Grease XG-4 and/or XL-5                                               | ESB-M1C93-B   |
| Threadlock and Sealer TA-25                                                         | WSK-M2G351-A5 |

**NOTE:** **MERCON®, MERCON® V, MERCON® SP, Motorcraft Premium Automatic Transmission Fluid and Motorcraft Continuously Variable Chain Type Transmission Fluid are not interchangeable transmission fluids. The use of any transmission fluid other than what is recommended for this transaxle will cause transaxle damage.**

**NOTE:** **If the transaxle was overhauled, or if installing a new transaxle and the transmission fluid cooler has not been flushed, flush the transmission fluid cooler at this time. For additional information, refer to Transmission Fluid Cooler - Backflushing and Cleaning.**

All vehicles

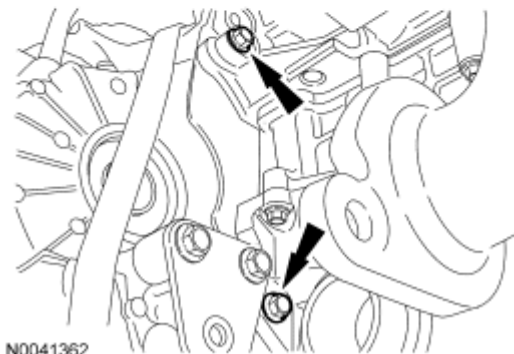
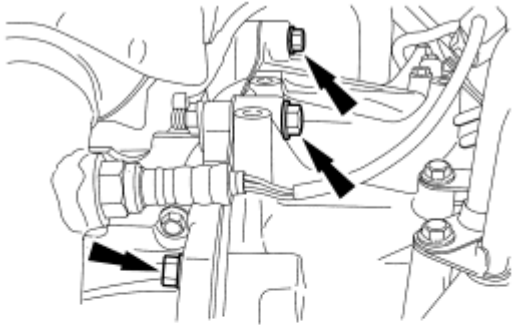
1. Prior to installing the transaxle, apply multi-purpose grease to the torque converter pilot hub.



N0041363

**Fig. 261: Identifying Torque Converter Pilot Hub**  
Courtesy of FORD MOTOR CO.

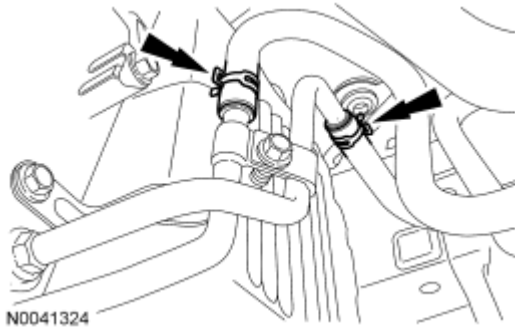
2. Position the transaxle to the back of the engine.
3. Install the 5 transaxle-to-engine bolts.
  - Tighten to 40 Nm (30 lb-ft).



N0041362

**Fig. 262: Locating Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

4. Connect the transmission fluid cooler hoses to the transmission fluid cooler tubes.



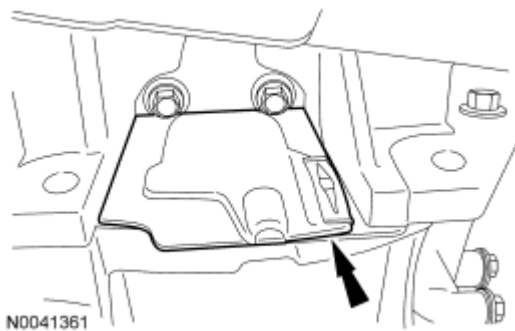
**Fig. 263: Locating Transmission Fluid Cooler Hoses**  
Courtesy of FORD MOTOR CO.

5. Install 3 new torque converter nuts.
  - Tighten to 36 Nm (27 lb-ft).



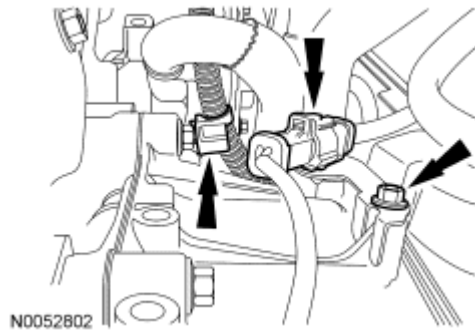
**Fig. 264: Locating Torque Converter Nuts**  
Courtesy of FORD MOTOR CO.

6. Install the inspection cover.



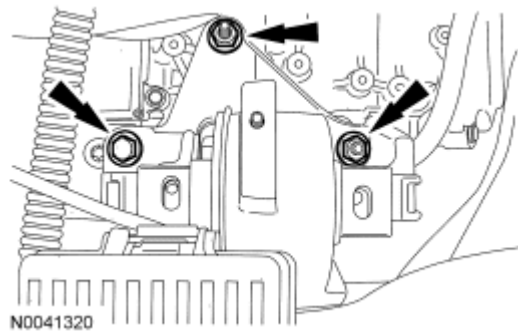
**Fig. 265: Identifying Inspection Cover**  
Courtesy of FORD MOTOR CO.

7. Connect the wiring harness fastener to the stud bolt and position the Heated Oxygen Sensor (HO2S) bracket in place and install the bolt.
  - Tighten to 12 Nm (106 lb-in).



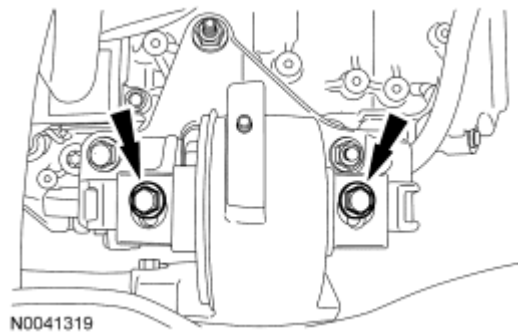
**Fig. 266: Identifying Heated Oxygen Sensor (HO2S) Bracket & Stud Bolt**  
Courtesy of FORD MOTOR CO.

8. Position the transaxle insulator bracket in place. Apply threadlock and sealer to the threads and install the 2 nuts and the bolt.
  - Tighten to 80 Nm (59 lb-ft).



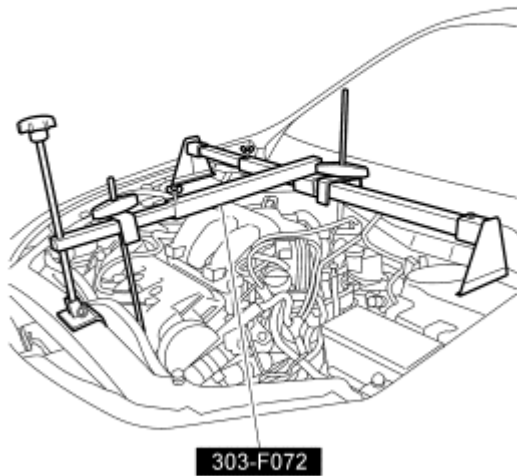
**Fig. 267: Locating Transaxle Insulator Bracket Nuts And Bolt**  
Courtesy of FORD MOTOR CO.

9. Raise the transaxle. Apply threadlock and sealer to the threads and install the 2 transaxle insulator-to-frame bolts.
  - Tighten to 62 Nm (46 lb-ft).



**Fig. 268: Locating Transaxle Insulator Bolts**  
Courtesy of FORD MOTOR CO.

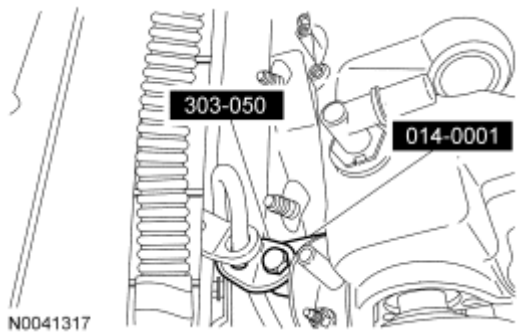
10. Remove the Engine Support Bar.



N0082626

**Fig. 269: Installing Engine Support Bar To Support Engine**  
Courtesy of FORD MOTOR CO.

11. Remove the Engine Lifting Bracket and the Universal Adapter Bracket "L" hook from the from the LH side of the engine.



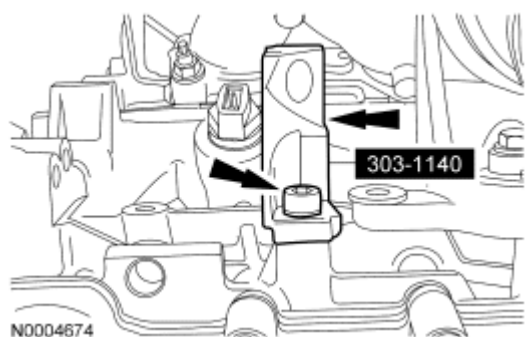
**Fig. 270: Identifying Universal Lifting Brackets**  
Courtesy of FORD MOTOR CO.

12. Remove the upper half of the Engine Lifting Bracket Set.



**Fig. 271: Identifying Upper Half Of Lifting Hook**  
Courtesy of FORD MOTOR CO.

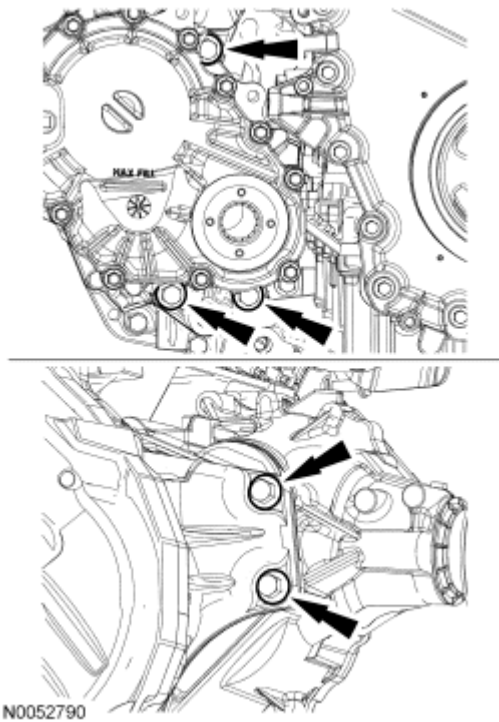
13. Remove the lower half of the Engine Lifting Bracket Set.



**Fig. 272: Identifying Lower Half Of Lifting Hook**  
Courtesy of FORD MOTOR CO.

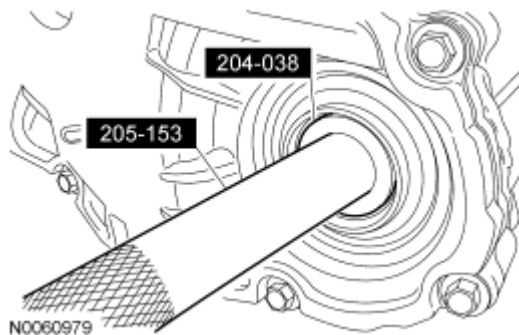
#### **All-Wheel Drive (AWD) vehicles**

14. Position the Power Transfer Unit (PTU) in place and install the 5 bolts.
  - Tighten to 90 Nm (66 lb-ft).



**Fig. 273: Locating PTU Bolts**  
Courtesy of FORD MOTOR CO.

15. Using the Bearing Cup Remover/Installer and Handle, install a new intermediate shaft seal.

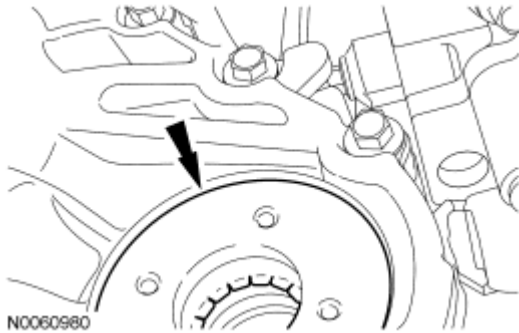


**Fig. 274: Identifying Intermediate Shaft Seal & Special Tools (204-038, 205-153)**  
Courtesy of FORD MOTOR CO.

**NOTE:** Do not overheat (melt) the seal deflector. If the deflector is damaged, a new one must be used.

16. Using the Heat Gun, heat the new seal deflector. Concentrate the heat across the back of the deflector near the white colored tabs. Install the seal deflector immediately after heating.
  - If necessary, use the PTU Drive Gear Outer Oil Seal Installer and Halfshaft Oil Seal Installer to seat the seal deflector. Make sure the deflector is fully seated and there are no cracks on the face or inner diameter white colored tab.

- For an alternate method to heat the seal deflector, place the deflector in boiling water for 3 to 5 minutes. Dry off deflector and install.
- Make sure the deflector is completely seated all the way around.



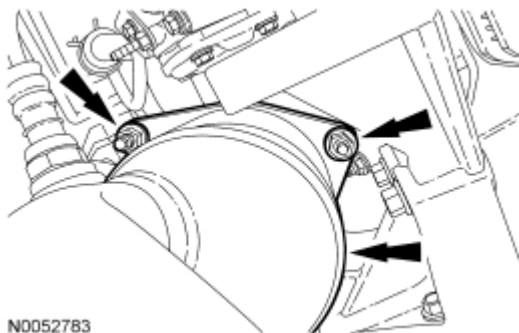
**Fig. 275: Identifying Seal Deflector**  
Courtesy of FORD MOTOR CO.

17. Position the PTU support bracket in place and install the 5 bolts.
- Tighten to 70 Nm (52 lb-ft).



**Fig. 276: Identifying PTU Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

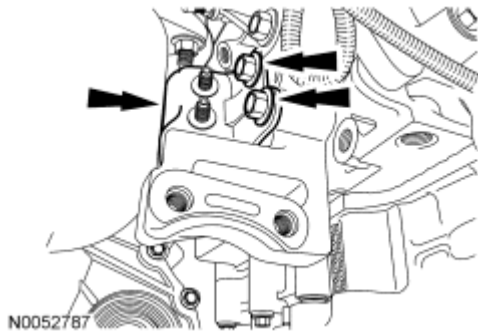
18. Position the RH catalytic converter in place and install the catalytic converter-to-exhaust manifold nuts.
- Tighten to 40 Nm (30 lb-ft).



**Fig. 277: Locating RH Catalytic Converter Nuts**

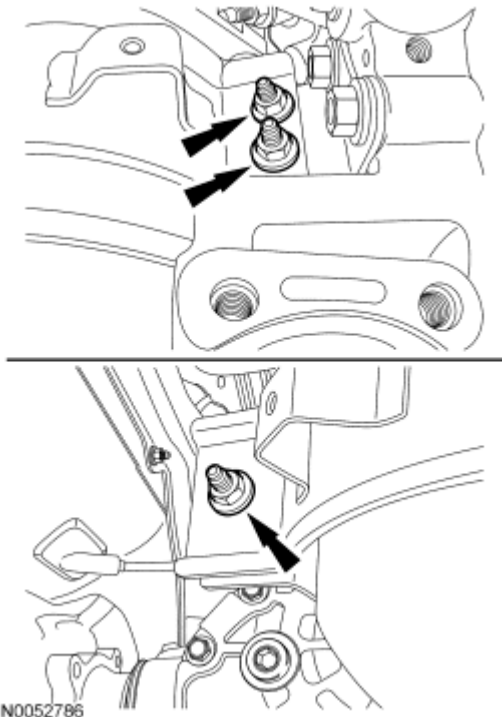
Courtesy of FORD MOTOR CO.

19. Install the catalytic converter band clamp LH half and the 2 bolts.
- Tighten to 40 Nm (30 lb-ft).



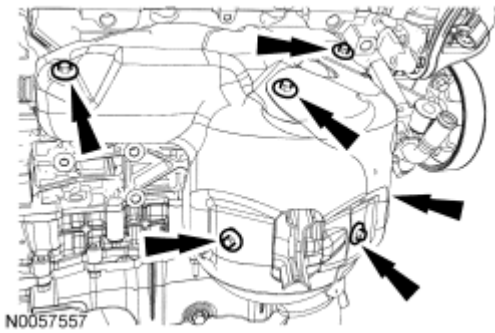
**Fig. 278: Locating Catalytic Converter Band Clamp LH Half Nuts**  
Courtesy of FORD MOTOR CO.

20. Install the catalytic converter band clamp RH half and install the 3 nuts.
- Tighten to 20 Nm (177 lb-in).



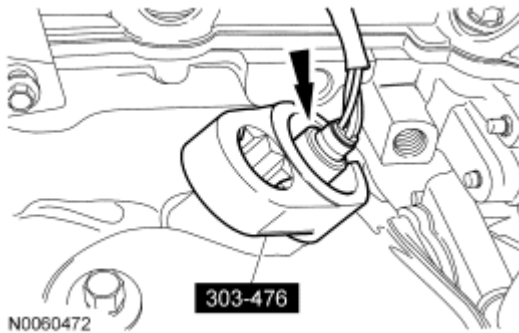
**Fig. 279: Locating RH Exhaust Heat Shield Bracket Nuts - Inboard Half**  
Courtesy of FORD MOTOR CO.

21. Install the RH exhaust manifold heat shield and the 6 bolts.
- Tighten to 11 Nm (97 lb-in).



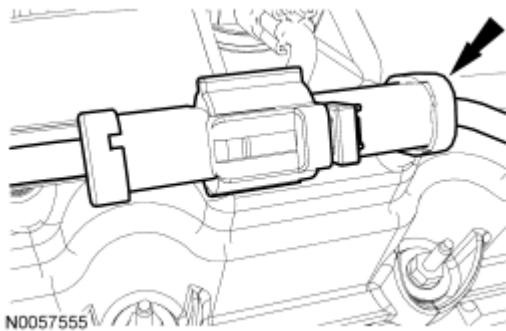
**Fig. 280: Locating RH Exhaust Heat Shield Bolts**  
Courtesy of FORD MOTOR CO.

22. Using the Exhaust Gas Oxygen Sensor Socket, install the RH HO2S.
- Tighten to 48 Nm (35 lb-ft).



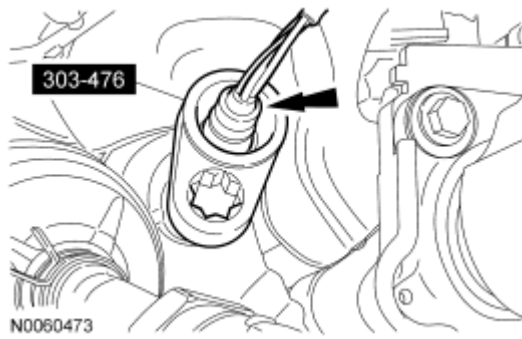
**Fig. 281: Identifying RH HO2S & Special Tool (303-476)**  
Courtesy of FORD MOTOR CO.

23. Connect the RH HO2S electrical connector.



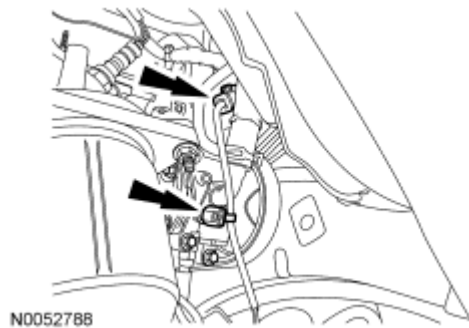
**Fig. 282: Identifying RH HO2S Electrical Connector**  
Courtesy of FORD MOTOR CO.

24. Using the Exhaust Gas Oxygen Sensor Socket, install the RH catalyst monitor sensor.
- Tighten to 48 Nm (35 lb-ft).



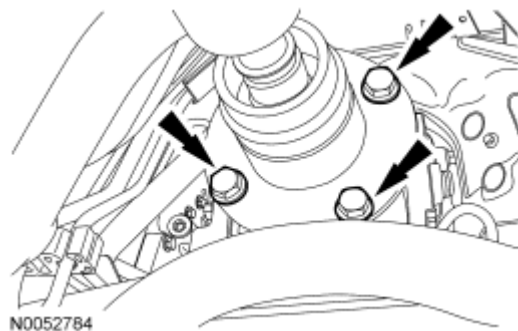
**Fig. 283: Identifying RH Catalyst Monitor Sensor & Special Tool (303-476)**  
Courtesy of FORD MOTOR CO.

25. Connect the RH catalyst monitor sensor electrical connector and attach the wiring harness retainer.



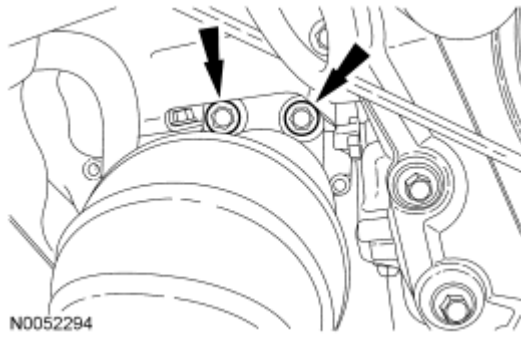
**Fig. 284: Locating RH Catalyst Monitor Sensor Electrical Connector & Wiring Retainer**  
Courtesy of FORD MOTOR CO.

26. Position the driveshaft in place, align the index marks made during removal and install the 4 driveshaft bolts.
  - Tighten to 70 Nm (52 lb-ft).



**Fig. 285: Identifying Drive Shaft Bolts**  
Courtesy of FORD MOTOR CO.

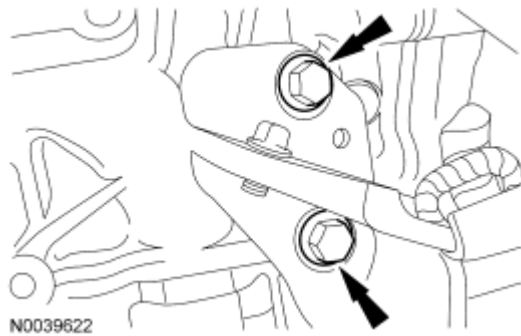
27. Position the RH halfshaft in place and install the 2 RH halfshaft bearing support bracket bolts.
  - Tighten to 23 Nm (17 lb-ft).



**Fig. 286: Locating RH Halfshaft Bearing Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

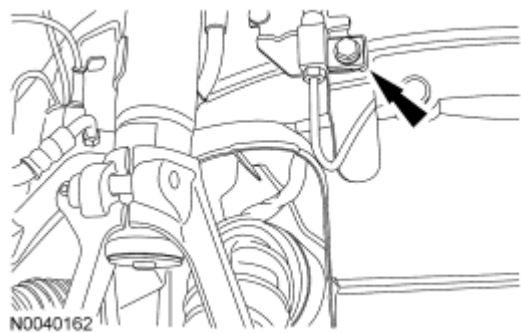
**Front Wheel Drive (FWD) vehicles**

28. Position the RH halfshaft in the transaxle and install the 2 RH halfshaft bearing support bracket bolts.
- Tighten to 55 Nm (41 lb-ft).



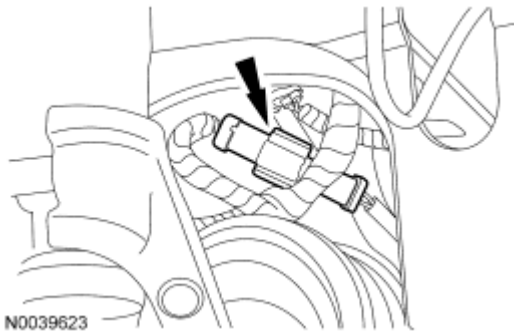
**Fig. 287: Locating RH Halfshaft Carrier Bearing Bracket Bolts**  
Courtesy of FORD MOTOR CO.

29. Install the bolt retaining the brake caliper hose.
- Tighten to 22 Nm (16 lb-ft).



**Fig. 288: Locating Brake Caliper Hose Bolt**  
Courtesy of FORD MOTOR CO.

30. Connect the HO2S to the RH halfshaft bearing support bracket.



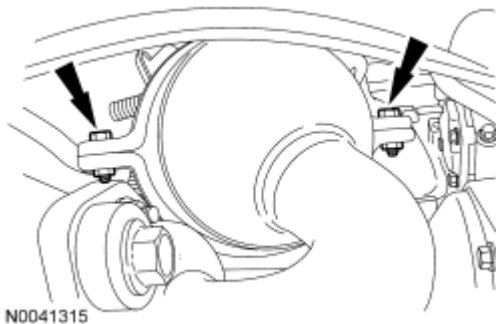
**Fig. 289: Locating Heated Oxygen Sensor (HO2S) Electrical Connector**  
Courtesy of FORD MOTOR CO.

31. Install the catalytic converter-to-engine block bracket and install the 2 bolts.
- Tighten to 35 Nm (26 lb-ft).



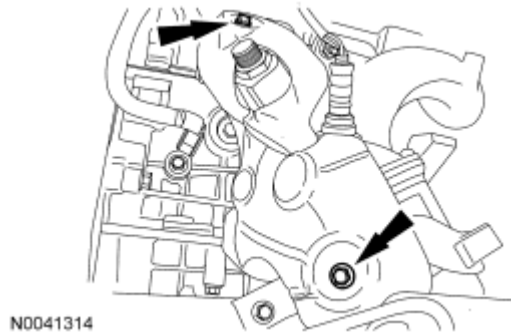
**Fig. 290: Locating Catalytic Converter-To-Engine Block Bracket And Bolts**  
Courtesy of FORD MOTOR CO.

32. Install the catalytic converter band clamp and the 2 bolts.
- Tighten to 20 Nm (177 lb-in).



**Fig. 291: Locating Catalytic Converter Band Clamp And Bolts**  
Courtesy of FORD MOTOR CO.

33. Install the RH exhaust manifold heat shield and the 2 bolts.
- Tighten to 11 Nm (97 lb-in).

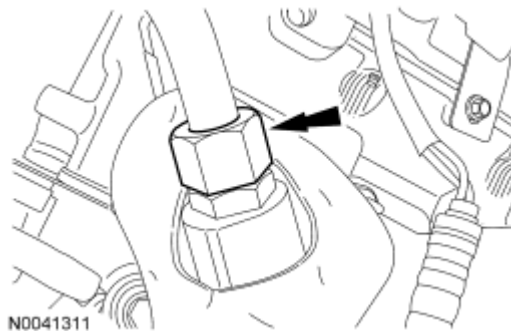


**Fig. 292: Locating RH Exhaust Manifold Heat Shield And Bolts**  
Courtesy of FORD MOTOR CO.

**All vehicles**

**NOTE:** FWD shown, AWD similar.

34. Loosely install the EGR tube nut on the RH exhaust manifold.

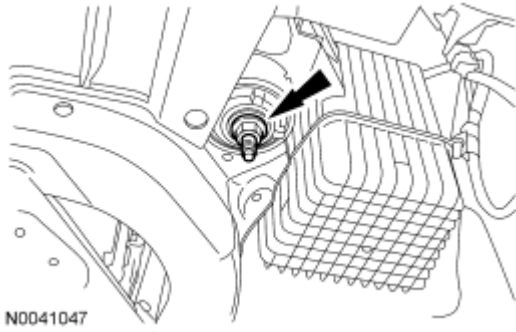


**Fig. 293: Locating EGR Tube Nut At RH Exhaust Manifold**  
Courtesy of FORD MOTOR CO.

35. Position the subframe in place using a suitable powertrain lift.

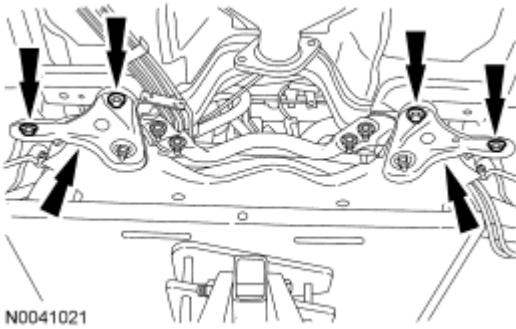
**NOTE:** LH shown, RH similar.

36. Install the front subframe nuts.
- Tighten to 150 Nm (111 lb-ft).



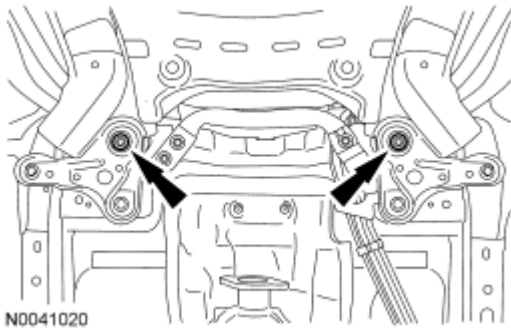
**Fig. 294: Locating Front Subframe Nuts**  
Courtesy of FORD MOTOR CO.

37. Position the subframe support brackets in place and loosely install the bolts.



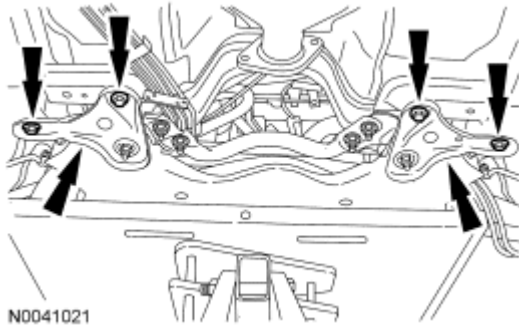
**Fig. 295: Locating Subframe Support Brackets And Bolts**  
Courtesy of FORD MOTOR CO.

38. Install the rear subframe nuts.
- Tighten to 150 Nm (111 lb-ft).



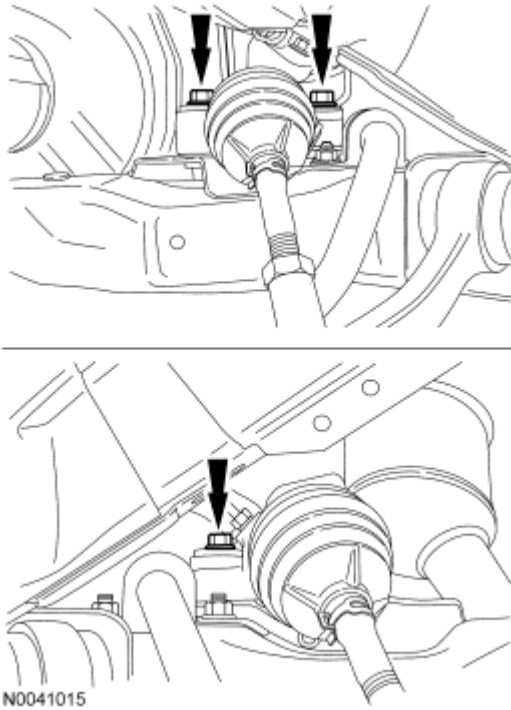
**Fig. 296: Locating Rear Subframe Nuts**  
Courtesy of FORD MOTOR CO.

39. Tighten the subframe support bracket bolts.
- Tighten to 103 Nm (76 lb-ft).



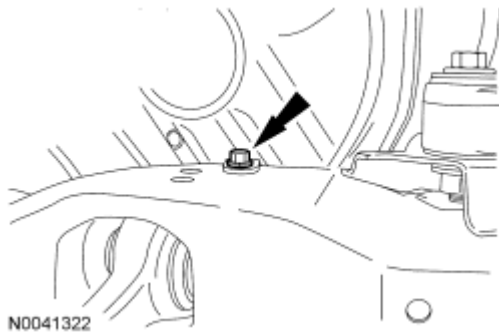
**Fig. 297: Locating Subframe Support Brackets And Bolts**  
Courtesy of FORD MOTOR CO.

40. Position the power steering gear in place and install the 3 bolts.
- Tighten to 107 Nm (79 lb-ft).



**Fig. 298: Locating Steering Gear Bolts**  
Courtesy of FORD MOTOR CO.

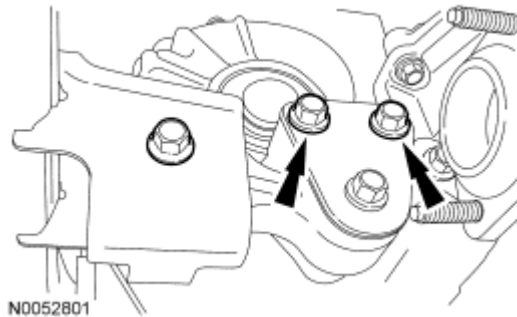
41. Position the power steering line bracket in place and install the bolts.
- Tighten to 9 Nm (80 lb-in).



**Fig. 299: Locating Power Steering Cooler Tube Bolts**  
Courtesy of FORD MOTOR CO.

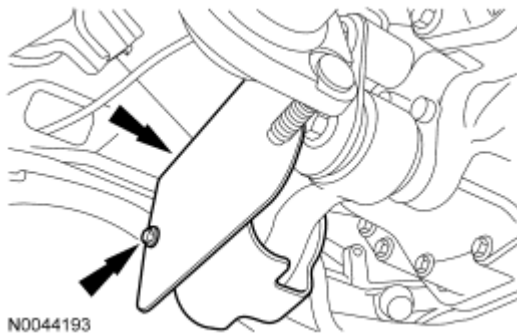
**NOTE:** FWD shown, AWD similar.

42. Install the 2 transaxle roll restrictor bolts.
- Tighten to 90 Nm (66 lb-ft).



**Fig. 300: Locating Engine Roll Restrictor Bracket Bolts**  
Courtesy of FORD MOTOR CO.

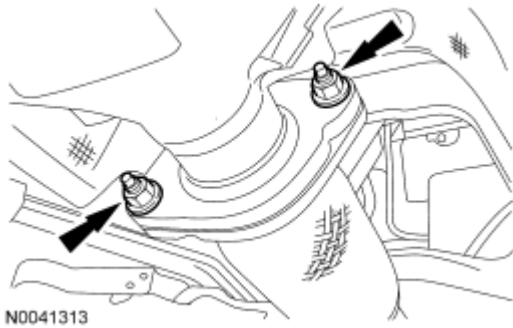
43. If equipped, install the roll restrictor heat shield and the bolts.



**Fig. 301: Locating Heat Shield And Bolts**  
Courtesy of FORD MOTOR CO.

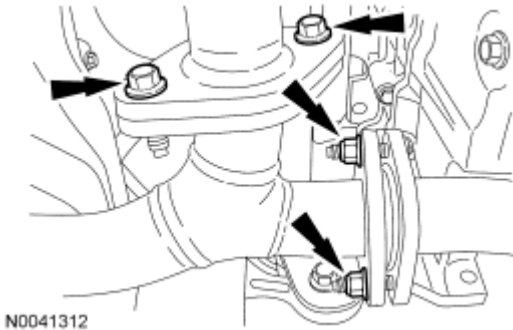
44. Position the Y-pipe assembly in place and install the 2 exhaust flexible pipe-to-catalytic converter nuts.

- Tighten to 40 Nm (30 lb-ft).



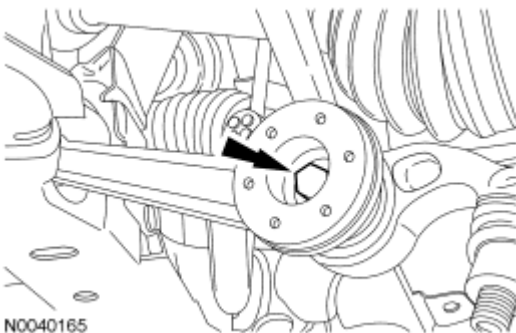
**Fig. 302: Locating Flex Pipe Nuts**  
Courtesy of FORD MOTOR CO.

45. Install the Y-pipe bolts and the Y-pipe nuts.
- Tighten to 40 Nm (30 lb-ft).



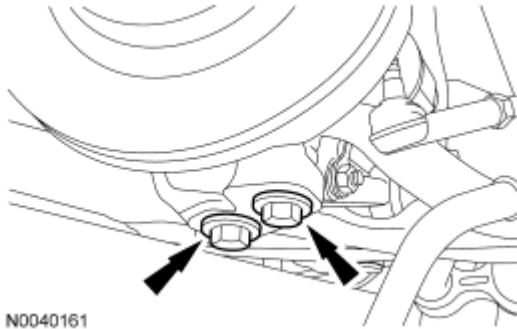
**Fig. 303: Locating Y-Pipe Bolts And Nuts**  
Courtesy of FORD MOTOR CO.

46. Install the RH damper fork through bolt connecting the fork to the lower control arm.
- Tighten to 103 Nm (76 lb-ft).



**Fig. 304: Locating Damper Fork Bolt**  
Courtesy of FORD MOTOR CO.

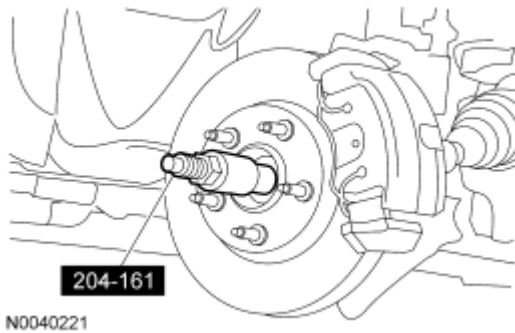
47. Position the lower control arms in the knuckle and install the nuts.
- Tighten to 200 Nm (148 lb-ft).



**Fig. 305: Locating Front And Rear Lower Control Arm Nuts**  
Courtesy of FORD MOTOR CO.

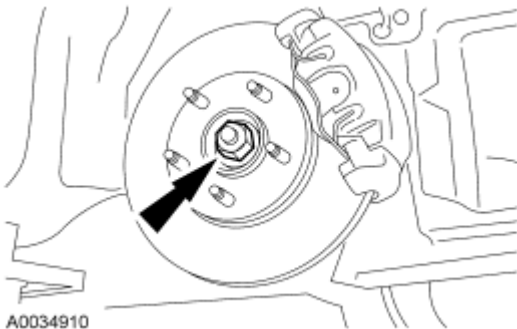
#### **AWD vehicles**

48. Using the Halfshaft Installer, install the LH halfshaft in the wheel hub. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.



**Fig. 306: Identifying Special Tool 204-161**  
Courtesy of FORD MOTOR CO.

49. Install the RH front wheel hub nut.
- Tighten 225 Nm (185 lb-ft).

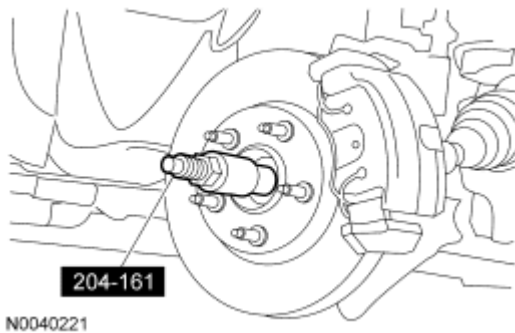


**Fig. 307: Locating Front Wheel Hub Nut**  
Courtesy of FORD MOTOR CO.

All vehicles

**NOTE:** LH shown, RH similar.

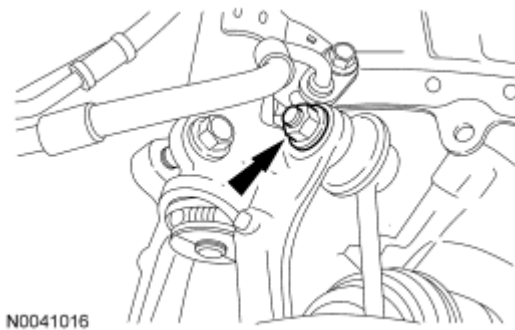
50. Using the Halfshaft Installer, install the RH halfshaft in the wheel hub. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.



**Fig. 308: Identifying Special Tool 204-161**  
Courtesy of FORD MOTOR CO.

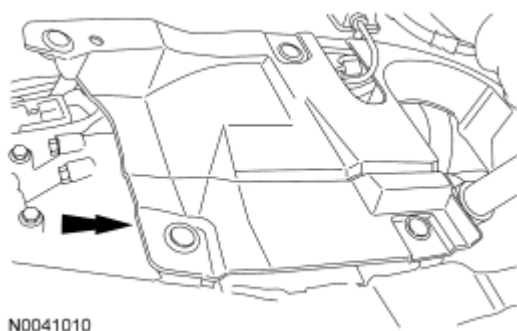
**NOTE:** LH shown, RH similar.

51. Position the sway bar links in the struts and install the nuts.
- Tighten to 40 Nm (30 lb-ft).



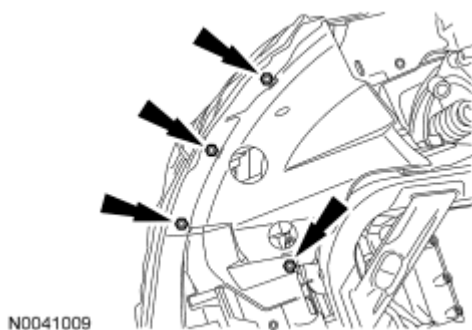
**Fig. 309: Locating Sway Bar Links Nut**  
Courtesy of FORD MOTOR CO.

52. Install the LH front structure to subframe splash shield and install the pin-type retainers.



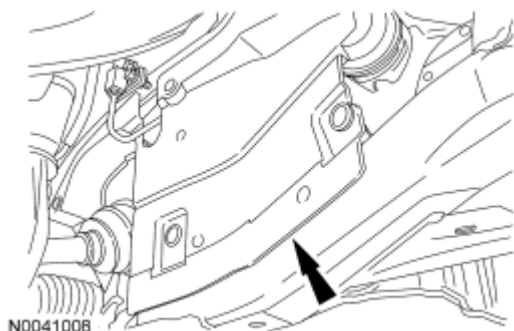
**Fig. 310: Locating LH Front Structure-To-Subframe Splash Shield**  
 Courtesy of FORD MOTOR CO.

53. Position the LH fender splash shield in place and install the 4 screws.



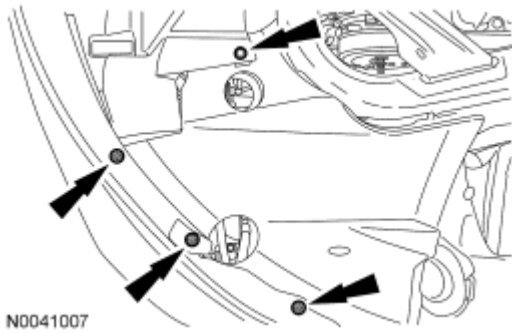
**Fig. 311: Locating LH Fender Splash Shield Screws**  
 Courtesy of FORD MOTOR CO.

54. Position the RH front structure-to-subframe splash shield in place and install the 6 pin-type retainers.



**Fig. 312: Locating RH Front Structure-To-Subframe Splash Shield**  
 Courtesy of FORD MOTOR CO.

55. Position the RH fender splash shield in place and install the 4 screws.



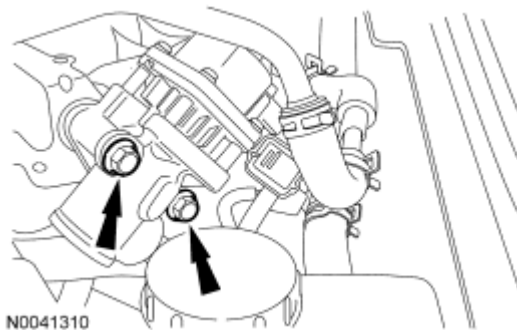
**Fig. 313: Locating RH Fender Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

56. Position the power steering line bracket on the right cylinder head and install the bolt.
- Tighten to 7 Nm (62 lb-in).



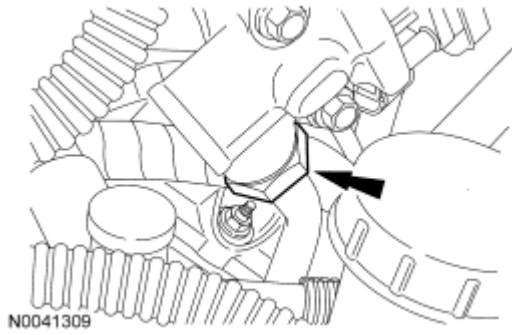
**Fig. 314: Locating Bracket For Power Steering Hose**  
Courtesy of FORD MOTOR CO.

57. Install a new gasket and the EGR valve and install the 2 bolts.
- Tighten to 25 Nm (18 lb-ft).



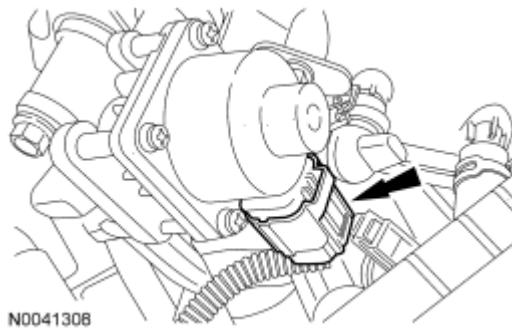
**Fig. 315: Locating EGR Valve And Bolts**  
Courtesy of FORD MOTOR CO.

58. Install the EGR tube on the valve.
- Tighten to 40 Nm (30 lb-ft).



**Fig. 316: Locating EGR Tube Nut**  
Courtesy of FORD MOTOR CO.

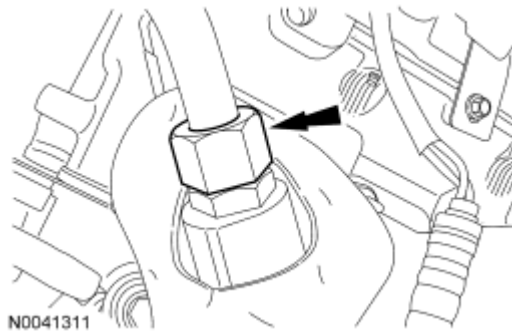
59. Connect the EGR valve electrical connector.



**Fig. 317: Locating EGR Valve Electrical Connector**  
Courtesy of FORD MOTOR CO.

**NOTE:** FWD shown, AWD similar.

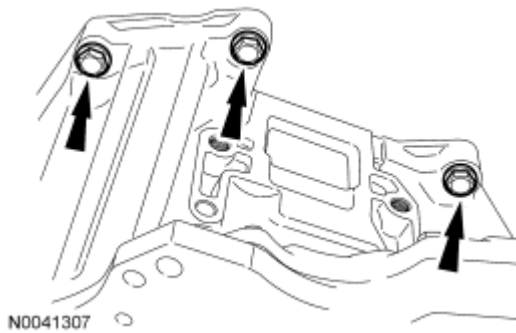
60. Tighten the EGR tube at the RH exhaust manifold.
- Tighten to 40 Nm (30 lb-ft).



**Fig. 318: Locating EGR Tube Nut At RH Exhaust Manifold**  
Courtesy of FORD MOTOR CO.

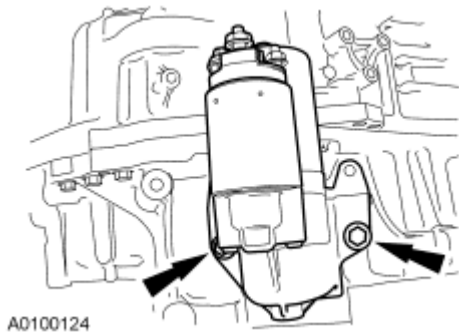
61. Install the 3 upper transaxle-to-engine retaining bolts.

- Tighten to 40 Nm (30 lb-ft).



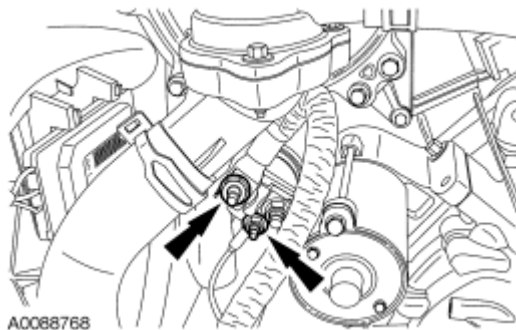
**Fig. 319: Locating Upper Torque Converter Housing Bolts**  
Courtesy of FORD MOTOR CO.

62. Install the starter and the 2 bolts.
- Tighten to 26 Nm (19 lb-ft).



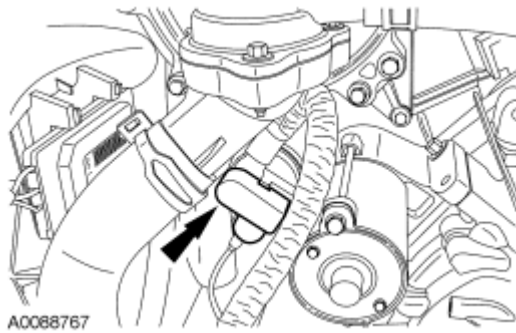
**Fig. 320: Locating Starter Bolts**  
Courtesy of FORD MOTOR CO.

63. Connect the 2 starter motor electrical connectors.
- Tighten the larger nut to 12 Nm (106 lb-in).
  - Tighten the smaller nut to 5 Nm (44 lb-in).



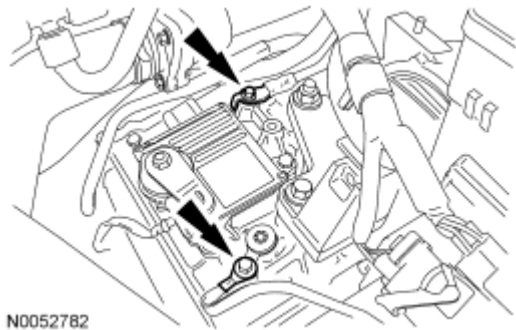
**Fig. 321: Identifying Starter Motor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

64. Install the electrical cover for the starter motor electrical connectors.



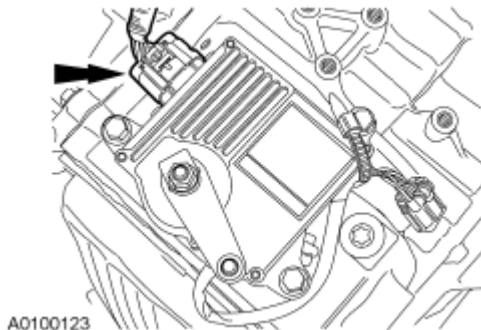
**Fig. 322: Identifying Electrical Cover For Starter Motor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

65. Install the 2 ground wires and ground wire bolts.
- Tighten to 12 Nm (106 lb-in).



**Fig. 323: Identifying Ground Straps & Ground Strap Bolts**  
Courtesy of FORD MOTOR CO.

66. Connect the Transmission Control Module (TCM) electrical connector.

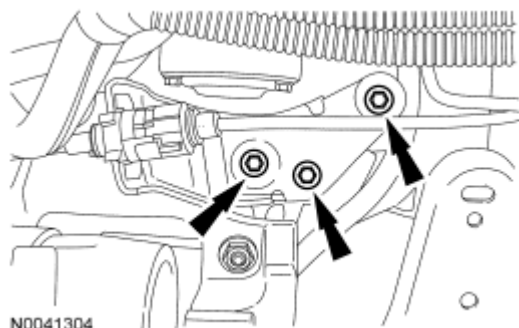


**Fig. 324: Identifying Transmission Control Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

67. Position the selector lever cable and bracket in place and install the selector lever cable nut and 2 selector

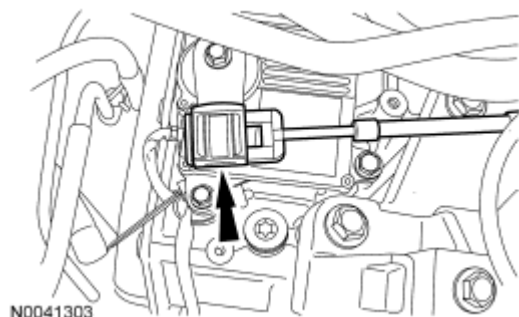
lever cable bolts.

- Tighten to 12 Nm (106 lb-in).



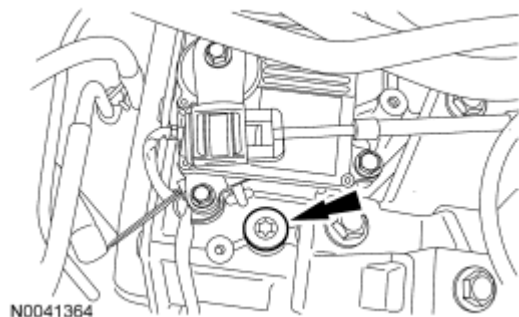
**Fig. 325: Locating Transaxle Control Cable Bracket Bolts**  
Courtesy of FORD MOTOR CO.

68. Connect the selector lever cable end.



**Fig. 326: Locating Selector Lever Cable End**  
Courtesy of FORD MOTOR CO.

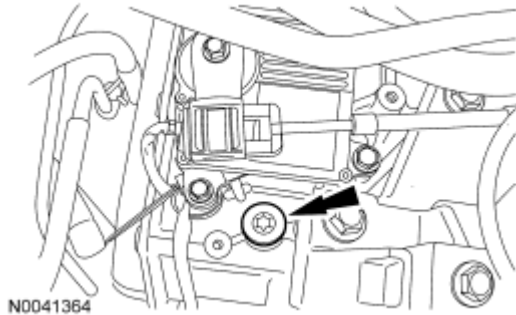
69. Remove the transmission fluid fill plug.



**Fig. 327: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

70. Fill the transaxle with clean transmission fluid.

71. Install the transmission fluid fill plug.
  - Tighten to 39 Nm (29 lb-ft).

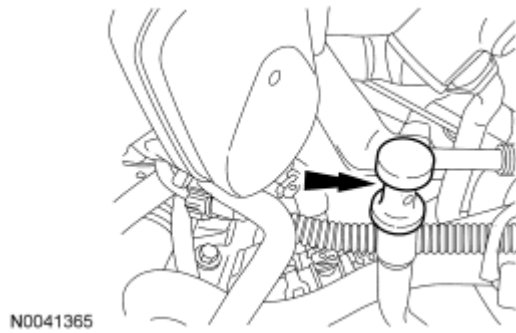


**Fig. 328: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

72. Install the air cleaner and outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 2.3L** article or **INTAKE AIR DISTRIBUTION AND FILTERING - 3.0L (4V)** article.
73. Install the battery tray and the battery. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
74. Remove the transmission fluid level indicator and make sure that the transaxle has transmission fluid in it.
75. With the transaxle in PARK, the vehicle on a level surface, the engine at idle (680-780 rpm) and foot pressed on the brake, move the selector lever through each gear and allow engagement of each gear. Place the selector lever back in the PARK position.
76. Wipe the transmission fluid level indicator cap and remove the transmission fluid level indicator.
77. Wipe the transmission fluid level indicator with a clean cloth.

**NOTE:** In order to get an accurate transmission fluid level reading, the vehicle should be on a level surface. Idle the engine to reach the normal operating temperature. Using the scan tool, verify that the transaxle is at normal operating temperature 60°C-70°C (140°F-158°F), prior to adjusting the transmission fluid level.

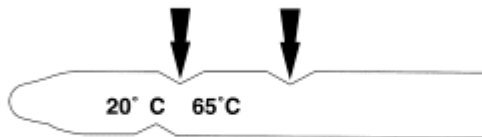
78. If transmission fluid needs to be added, add transmission fluid in 0.25L (1/2 pt) increments through the transmission fluid fill plug located on the top of the transaxle near the transmission fluid level indicator. Do not overfill the transmission fluid. Install the transmission fluid level indicator back in the transmission fluid filler tube until it is fully seated, then remove the transmission fluid level indicator. The transmission fluid level should be at the upper most mark on the transmission fluid level indicator. Only fill to the upper most mark on the transmission fluid level indicator. Do not overfill. Damage to the transaxle will occur.



**Fig. 329: Locating Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at normal operating temperature of 60°C-70°C (140°F-158°F) is between the top 2 marks on the fluid level indicator.

79. Fill the transaxle to the correct fluid level.

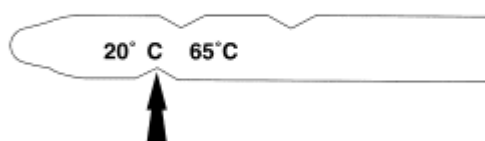


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**Fig. 330: Locating Temperature Marks On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at cold operating temperature of 15°C-25°C (59°F-77°F) is at the bottom mark on the transmission fluid level indicator.

80. If the Transmission Fluid Temperature (TFT) is low, fill the transaxle with transmission fluid to the cold range on the transmission fluid level indicator. Recheck the transmission fluid level when the transaxle has reached the normal operating temperature.



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**Fig. 331: Locating Bottom Mark On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

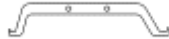
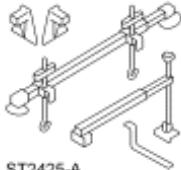
## TRANSAXLE - 3.5L

### Special Tools

| Illustration                                                                                    | Tool Name                     | Tool Number           |
|-------------------------------------------------------------------------------------------------|-------------------------------|-----------------------|
| <br>ST2976A   | Engine Lifting Bracket        | 303-1245              |
| <br>ST1255-A | Handle                        | 205-153 (T80T-4000-W) |
| <br>ST1073-A | Heat Gun                      | 107-R0300             |
| <br>ST2138-A | Installer, Halfshaft          | 204-161 (T97P-1175-A) |
| <br>ST2572-A | Installer, Halfshaft Oil Seal | 308-431               |
|                                                                                                 |                               |                       |

## 2008 Ford Fusion S

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Aisin AW21 - Fusion, Milan & MKZ

|                                                                                                 |                                                                                                                                       |                       |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <br>ST2571-A   | Installer, PTU Drive Gear Outer Oil Seal                                                                                              | 308-430               |
| <br>ST2793-A   | Lifting Bracket, Engine                                                                                                               | 303-050 (T70P-6000)   |
| <br>ST1568-A   | Remover/Installer, Bearing Cup                                                                                                        | 204-038 (T77F-1217-A) |
| <br>ST2977-A   | Spreader Bar                                                                                                                          | 303-1246              |
| <br>ST2425-A | Support Bar, Engine                                                                                                                   | 303-F072              |
| <br>ST2834-A | Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool |                       |

### Material

| Item                                                                                | Specification |
|-------------------------------------------------------------------------------------|---------------|
| Motorcraft Premium Automatic Transmission Fluid XT-8-QAW (US); CXT-8-LAW12 (Canada) | WSS-M2C924-A  |
| Multi-Purpose Grease XG-4 and/or XL-5                                               | ESB-M1C93-B   |
| Threadlock and Sealer TA-25                                                         | WSK-M2G351-A5 |

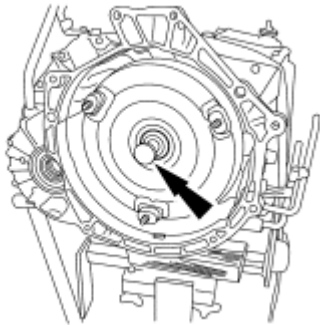
**NOTE:** **MERCON®, MERCON® V, MERCON® SP, Motorcraft Premium Automatic Transmission Fluid and Motorcraft Continuously Variable Chain Type**

**Transmission Fluid are not interchangeable transmission fluids. The use of any transmission fluid other than what is recommended for this transaxle will cause transaxle damage.**

**NOTE:** If the transaxle was overhauled, or if installing a new transaxle and the transmission fluid cooler has not been flushed, flush the transmission fluid cooler at this time. For additional information, refer to Transmission Fluid Cooler - Backflushing and Cleaning.

#### **All vehicles**

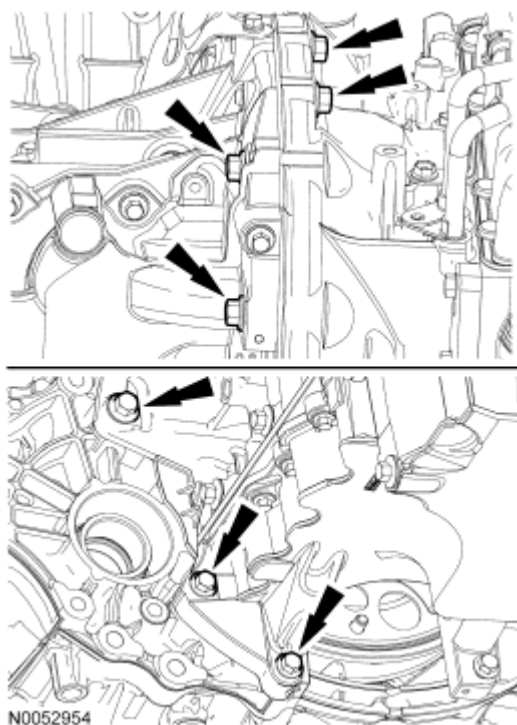
1. Prior to installing the transaxle, apply multi-purpose grease to the torque converter pilot hub.



N0041363

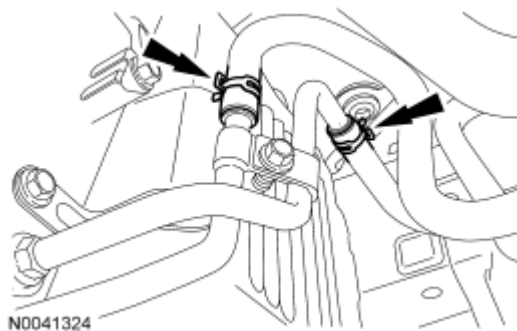
**Fig. 332: Identifying Torque Converter Pilot Hub**  
Courtesy of FORD MOTOR CO.

2. Position the transaxle to the back of the engine.
3. Install the 7 transaxle-to-engine bolts.
  - Tighten to 48 Nm (35 lb-ft).



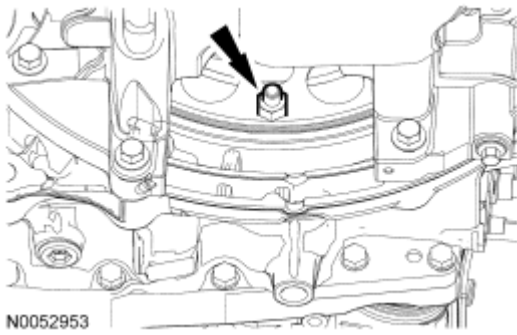
**Fig. 333: Locating Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

4. Connect the transmission fluid cooler hoses to the transmission cooler tubes.



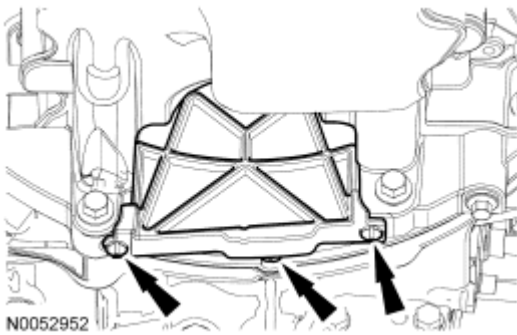
**Fig. 334: Locating Transmission Fluid Cooler Hoses**  
Courtesy of FORD MOTOR CO.

5. Install 4 new torque converter nuts.
  - Tighten to 36 Nm (27 lb-ft).



**Fig. 335: Identifying Torque Converter Nuts**  
Courtesy of FORD MOTOR CO.

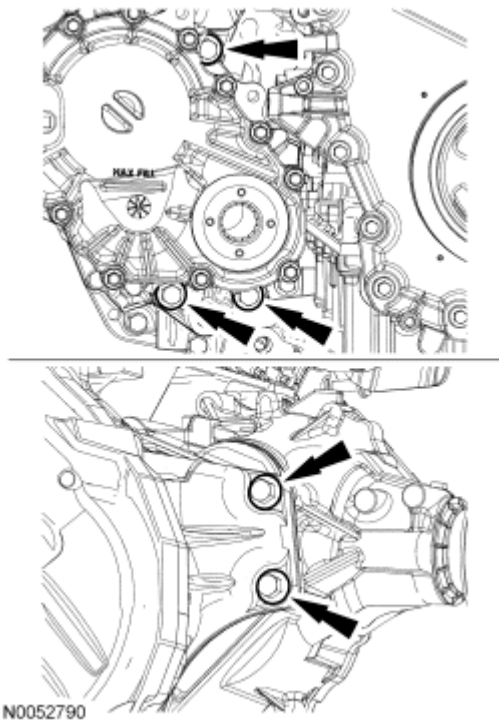
6. Position the inspection cover in place and install the 2 fasteners.



**Fig. 336: Identifying Inspection Cover & Fasteners**  
Courtesy of FORD MOTOR CO.

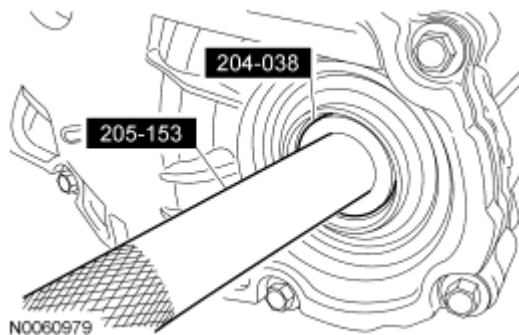
#### **All-Wheel Drive (AWD) vehicles**

7. Position the power transfer unit Power Transfer Unit (PTU) in place and install the 5 bolts.
  - Tighten to 90 Nm (66 lb-ft).



**Fig. 337: Locating PTU Bolts**  
Courtesy of FORD MOTOR CO.

8. Using the Bearing Cup Remover/Installer and Handle, install a new intermediate shaft seal.

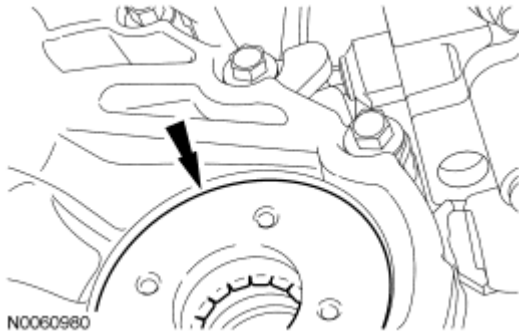


**Fig. 338: Identifying Intermediate Shaft Seal & Special Tools (204-038, 205-153)**  
Courtesy of FORD MOTOR CO.

**NOTE:** Do not overheat (melt) the seal deflector. If the deflector is damaged, a new one must be used.

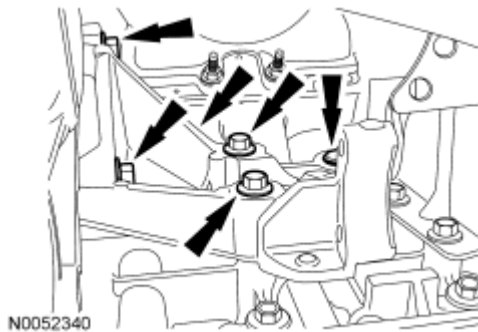
9. Using the Heat Gun, heat the new seal deflector. Concentrate the heat across the back of the deflector near the white-colored tabs. Install the seal deflector immediately after heating.
  - If necessary, use the PTU Drive Gear Outer Oil Seal Installer and Halfshaft Oil Seal Installer to seat the seal deflector. Make sure the deflector is fully seated and there are no cracks on the face or inner diameter white-colored tab.

- For an alternate method to heat the seal deflector, place the deflector in boiling water for 3 to 5 minutes. Dry off deflector and install.
- Make sure the deflector is completely seated all the way around.



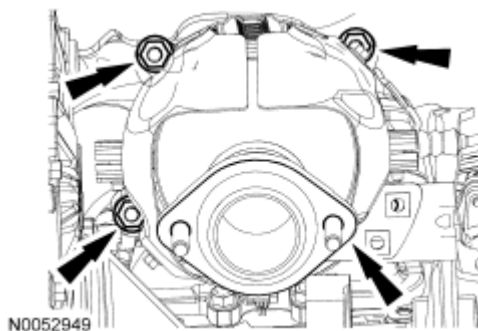
**Fig. 339: Identifying Seal Deflector**  
Courtesy of FORD MOTOR CO.

10. Position the PTU support bracket in place and install the 5 bolts.
  - Tighten to 70 Nm (52 lb-ft).



**Fig. 340: Locating Power Transfer Unit (PTU) Support Bracket & Bolts**  
Courtesy of FORD MOTOR CO.

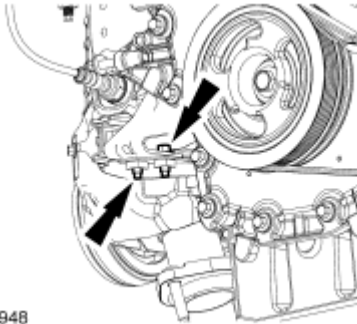
11. Position the RH catalytic converter in place and install the 4 nuts.
  - Tighten to 40 Nm (30 lb-ft).



**Fig. 341: Locating RH Catalytic Converter Nuts**

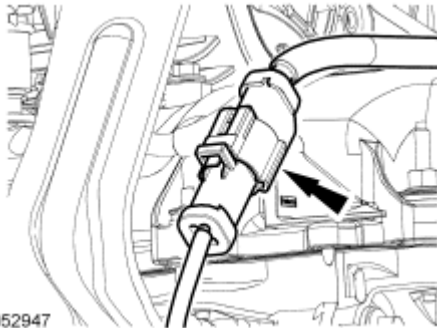
Courtesy of FORD MOTOR CO.

12. Install the 2 catalytic converter bracket bolts.
  - Tighten to 20 Nm (177 lb-in).



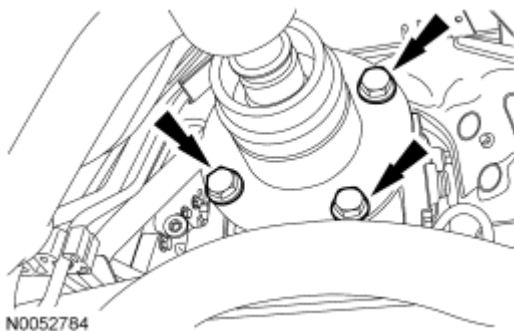
**Fig. 342: Identifying Catalytic Converter Bracket Bolts**  
Courtesy of FORD MOTOR CO.

13. Connect the RH catalyst monitor sensor electrical connector.



**Fig. 343: Locating RH Catalyst Monitor Electrical Connector**  
Courtesy of FORD MOTOR CO.

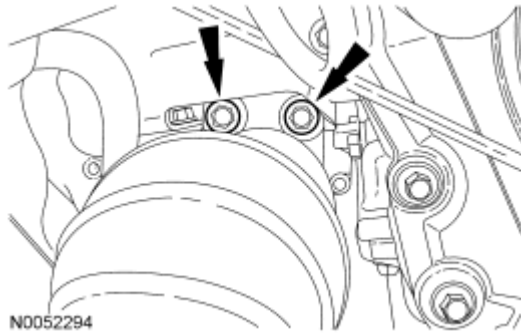
14. Position the driveshaft in place, align the index marks made during removal and install the bolts.
  - Tighten to 70 Nm (52 lb-ft).



**Fig. 344: Identifying Drive Shaft Bolts**

Courtesy of FORD MOTOR CO.

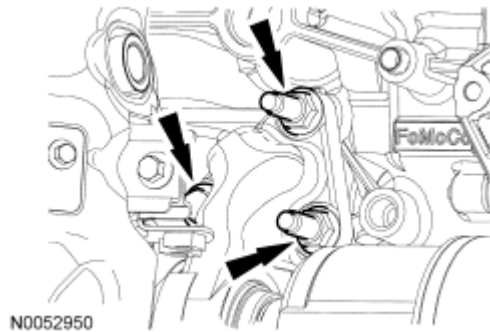
15. Position the RH halfshaft in the transaxle and in the wheel hub and install the 2 bolts.
  - Tighten to 23 Nm (17 lb-ft).



**Fig. 345: Locating RH Halfshaft Bearing Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

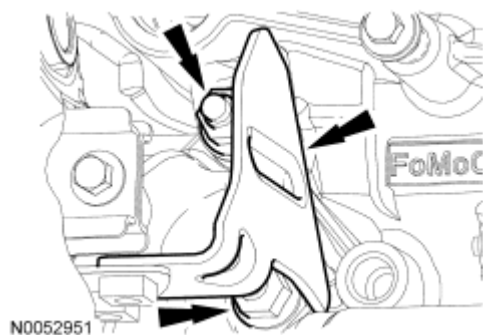
**Front Wheel Drive (FWD) vehicles**

16. Install the RH halfshaft in the transaxle and install the 3 bolts.
  - Tighten to 55 Nm (41 lb-ft).



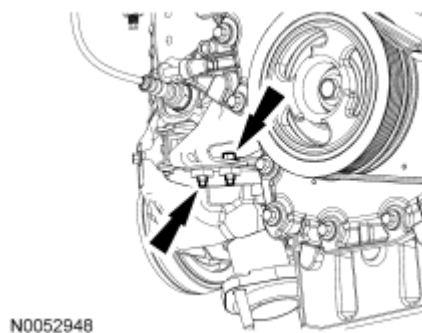
**Fig. 346: Identifying Intermediate Shaft Bearing Support Bracket & Nuts**  
Courtesy of FORD MOTOR CO.

17. Install the catalytic converter support bracket and install the 2 nuts.
  - Tighten to 23 Nm (17 lb-ft).



**Fig. 347: Identifying Catalytic Converter Support Bracket & Nuts**  
Courtesy of FORD MOTOR CO.

18. Install the 2 catalytic converter bracket bolts.
  - Tighten to 20 Nm (177 lb-in).

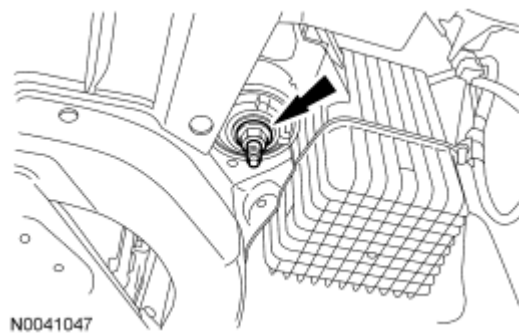


**Fig. 348: Identifying Catalytic Converter Bracket Bolts**  
Courtesy of FORD MOTOR CO.

All vehicles

**NOTE:** LH shown, RH similar.

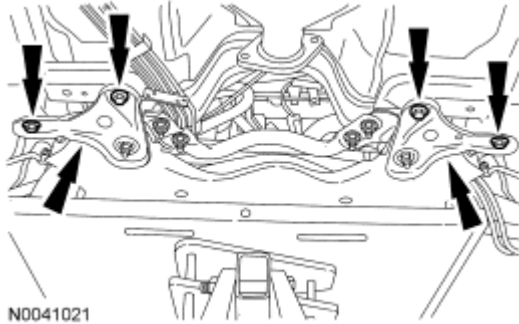
19. Position the subframe in place and install the 2 front subframe nuts.
  - Tighten to 150 Nm (111 lb-ft).



**Fig. 349: Locating Front Subframe Nuts**

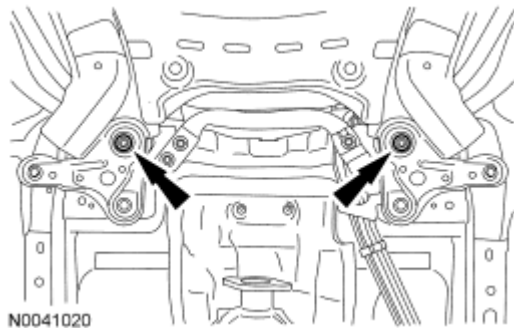
Courtesy of FORD MOTOR CO.

20. Position the subframe support brackets in place and loosely install the bolts.



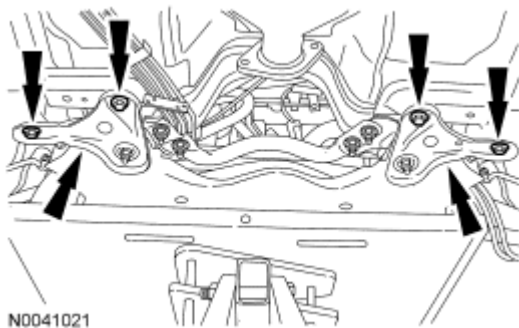
**Fig. 350: Locating Subframe Support Brackets And Bolts**  
Courtesy of FORD MOTOR CO.

21. Install the rear subframe nuts.
- Tighten to 150 Nm (111 lb-ft).



**Fig. 351: Locating Rear Subframe Nuts**  
Courtesy of FORD MOTOR CO.

22. Tighten the subframe support bracket bolts.
- Tighten to 103 Nm (76 lb-ft).

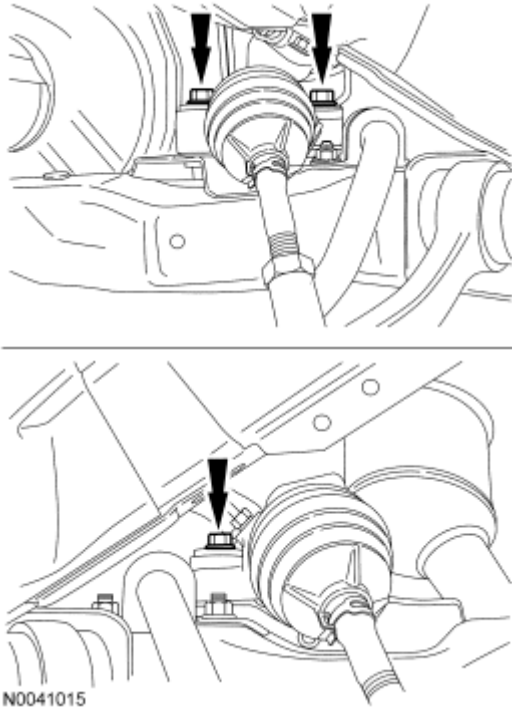


**Fig. 352: Locating Subframe Support Brackets And Bolts**

Courtesy of FORD MOTOR CO.

23. Position the steering gear in place and install the 3 bolts.

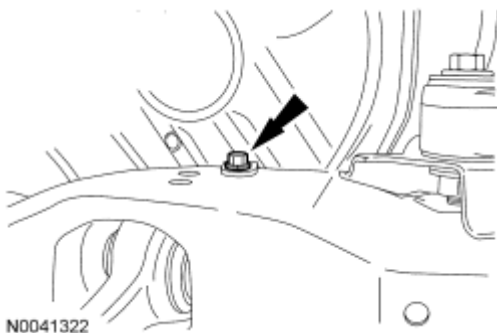
- Tighten to 107 Nm (79 lb-ft).



**Fig. 353: Locating Steering Gear Bolts**  
Courtesy of FORD MOTOR CO.

24. Position the power steering cooler line bracket in place and install the bolts.

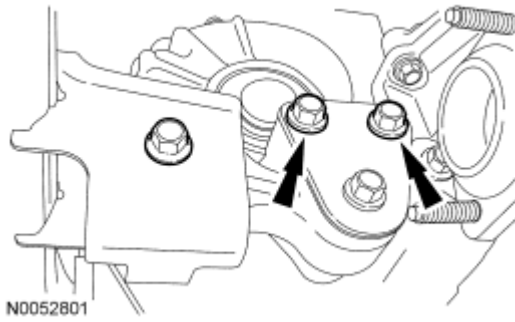
- Tighten to 9 Nm (80 lb-in).



**Fig. 354: Locating Power Steering Cooler Tube Bolts**  
Courtesy of FORD MOTOR CO.

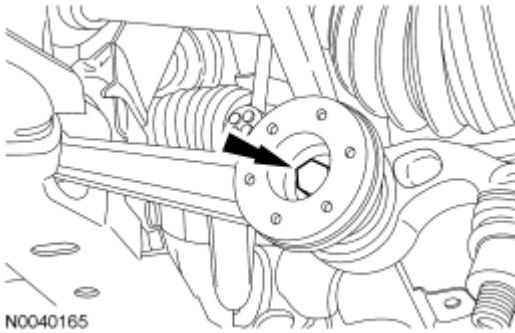
25. Install the 2 roll restrictor bracket bolts.

- Tighten to 90 Nm (66 lb-ft).



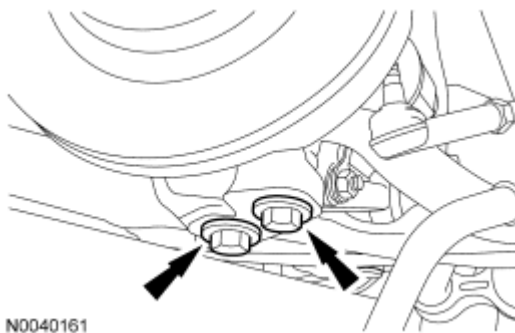
**Fig. 355: Locating Engine Roll Restrictor Bracket Bolts**  
 Courtesy of FORD MOTOR CO.

26. Install the RH damper fork through bolt connecting the fork to the lower control arm.
  - Tighten to 103 Nm (76 lb-ft).



**Fig. 356: Locating Damper Fork Bolt**  
 Courtesy of FORD MOTOR CO.

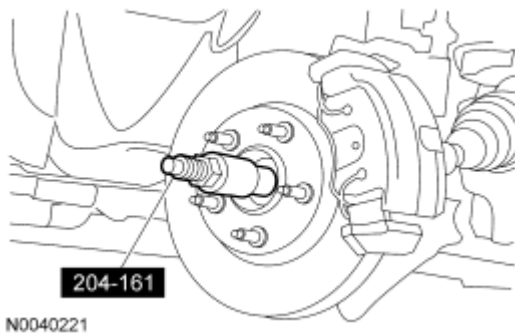
27. Position the lower control arms in the knuckle and install the nuts.
  - Tighten to 200 Nm (148 lb-ft).



**Fig. 357: Locating Front And Rear Lower Control Arm Nuts**  
 Courtesy of FORD MOTOR CO.

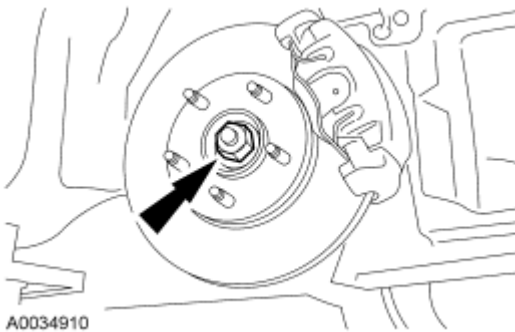
**AWD vehicles**

28. Using the Halfshaft Installer, install the halfshaft in the wheel hub.



**Fig. 358: Identifying Special Tool 204-161**  
Courtesy of FORD MOTOR CO.

29. Install a new front wheel hub nut.
- Tighten to 255 Nm (185 lb-ft).



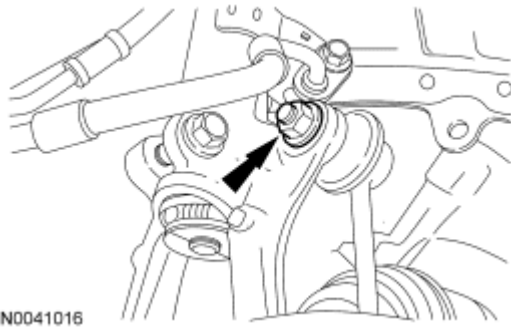
**Fig. 359: Locating Front Wheel Hub Nut**  
Courtesy of FORD MOTOR CO.

#### **All vehicles**

30. Install the LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.

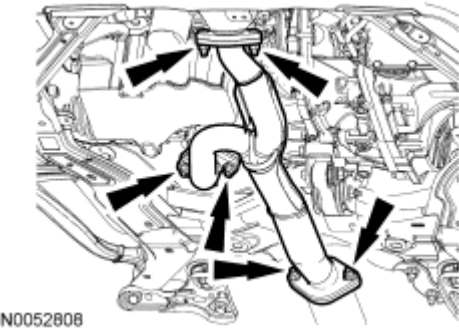
**NOTE:**        **LH shown, RH similar.**

31. Position the sway bar links in the struts and install the nuts.
- Tighten to 40 Nm (30 lb-ft).



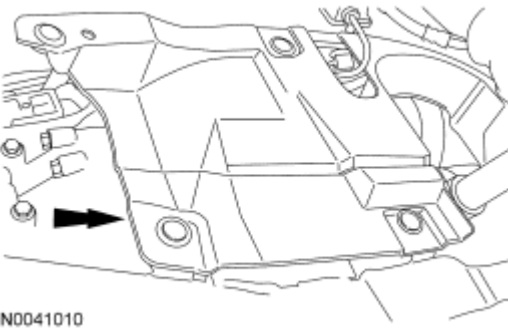
**Fig. 360: Locating Sway Bar Links Nut**  
Courtesy of FORD MOTOR CO.

32. Position the Y-pipe in place and install the 6 Y-pipe nuts.
  - Tighten to 40 Nm (30 lb-ft).



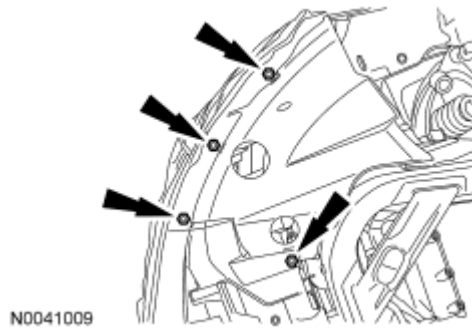
**Fig. 361: Locating Y-Pipe Nuts & Y-Pipe Assembly**  
Courtesy of FORD MOTOR CO.

33. Install the LH front structure to subframe splash shield and install the pin-type retainers.



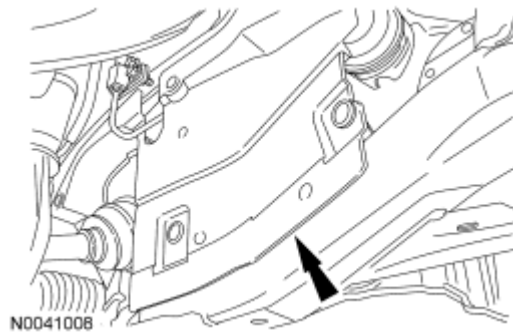
**Fig. 362: Locating LH Front Structure-To-Subframe Splash Shield**  
Courtesy of FORD MOTOR CO.

34. Position the LH fender splash shield in place and install the 4 screws.



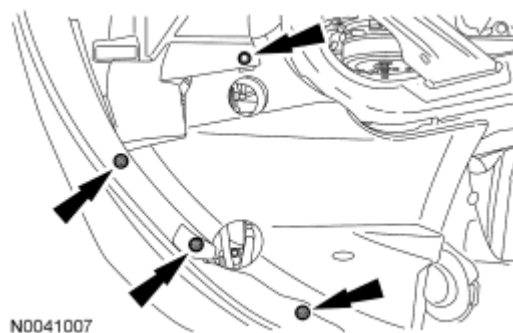
**Fig. 363: Locating LH Fender Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

35. Position the RH front structure-to-subframe splash shield in place and install the 6 pin-type retainers.



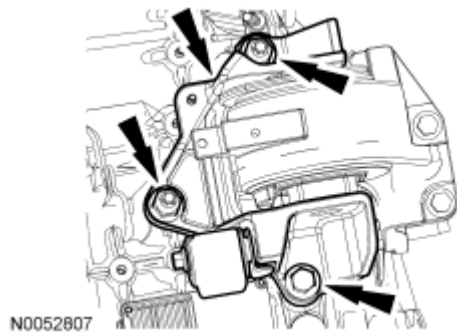
**Fig. 364: Locating RH Front Structure-To-Subframe Splash Shield**  
Courtesy of FORD MOTOR CO.

36. Position the RH fender splash shield in place and install the 4 screws.



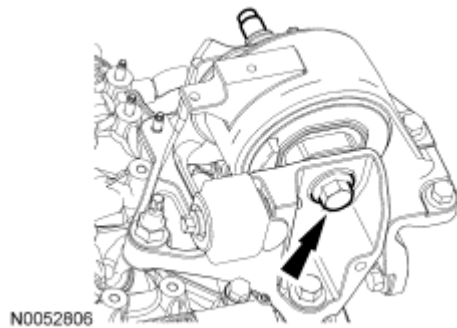
**Fig. 365: Locating RH Fender Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

37. Apply threadlock and sealer to the threads and install the transaxle support insulator bracket, the 2 nuts and the bolt.
- Tighten to 80 Nm (59 lb-ft).



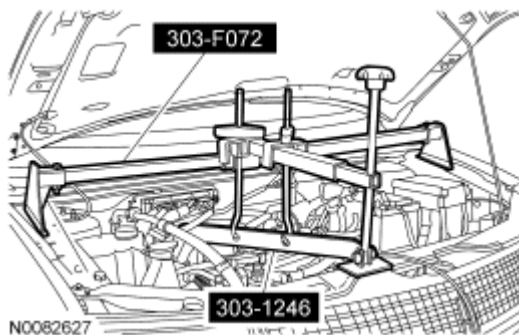
**Fig. 366: Locating Transaxle Support Insulator Bracket Nuts & Bolt**  
Courtesy of FORD MOTOR CO.

38. Using the Engine Support Bar, raise the transaxle. Apply threadlock and sealant to the threads and install the transaxle support insulator through bolt.
  - Tighten to 130 Nm (96 lb-ft).



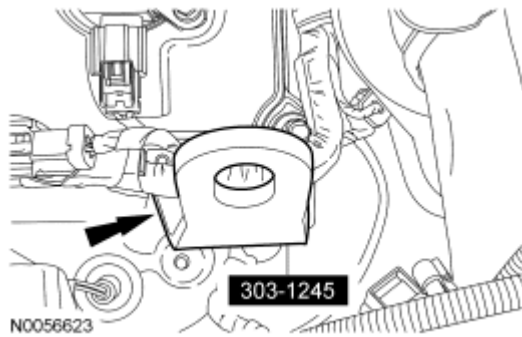
**Fig. 367: Identifying Transaxle Support Insulator Through Bolt**  
Courtesy of FORD MOTOR CO.

39. Remove the Engine Support Bar and Spreader Bar.



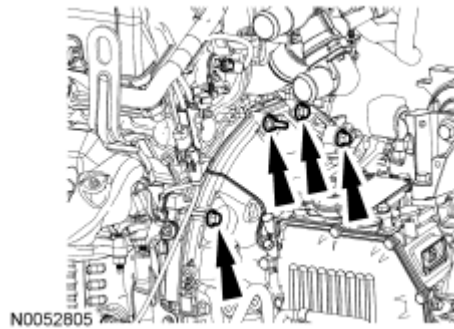
**Fig. 368: Installing Engine Support Bar & Spreader Bar To Support Engine**  
Courtesy of FORD MOTOR CO.

40. Remove the Engine Lifting Bracket from the LH cylinder head.



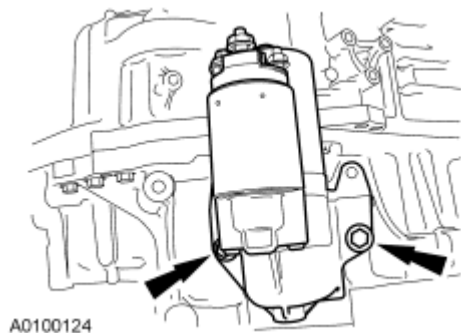
**Fig. 369: Special Tool (303-1245) On LH Cylinder Head**  
Courtesy of FORD MOTOR CO.

41. Install the 4 upper transaxle-to-engine bolts.
  - Tighten to 48 Nm (35 lb-ft).



**Fig. 370: Identifying Upper Transaxle-To-Engine Bolts**  
Courtesy of FORD MOTOR CO.

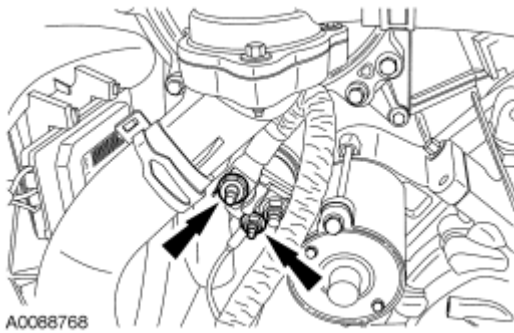
42. Install the starter and the 2 bolts.
  - Tighten to 26 Nm (19 lb-ft).



**Fig. 371: Locating Starter Bolts**  
Courtesy of FORD MOTOR CO.

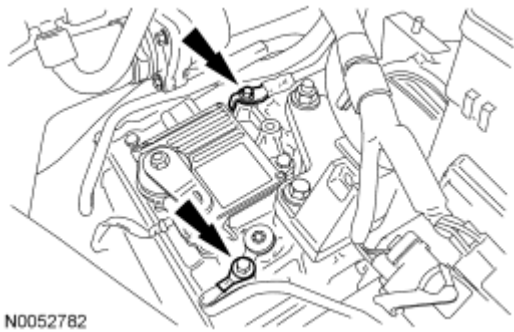
43. Connect the 2 starter motor electrical connectors and position back the electrical terminal cover.
  - Tighten the larger nut to 12 Nm (106 lb-in).

- Tighten the smaller nut to 5 Nm (44 lb-in).



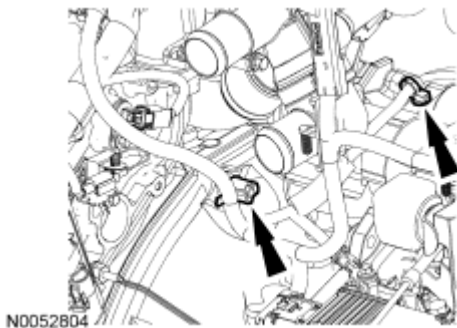
**Fig. 372: Identifying Starter Motor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

44. Position the 2 ground straps in place and install the 2 ground strap bolts.
  - Tighten to 12 Nm (106 lb-in).



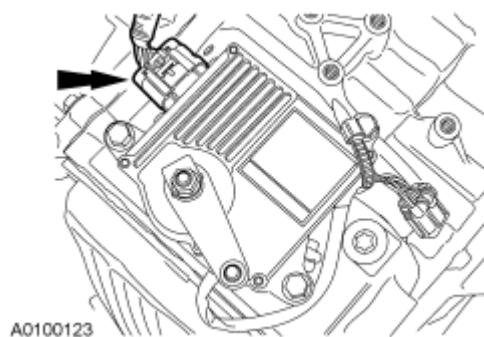
**Fig. 373: Identifying Ground Straps & Ground Strap Bolts**  
Courtesy of FORD MOTOR CO.

45. Connect the wiring harness fasteners on the torque converter housing stud bolt and the starter motor.



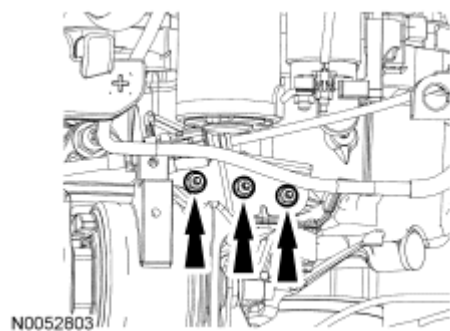
**Fig. 374: Identifying Wiring Harness Fasteners & Torque Converter Housing Stud Bolt**  
Courtesy of FORD MOTOR CO.

46. Connect the Transmission Control Module (TCM) electrical connector.



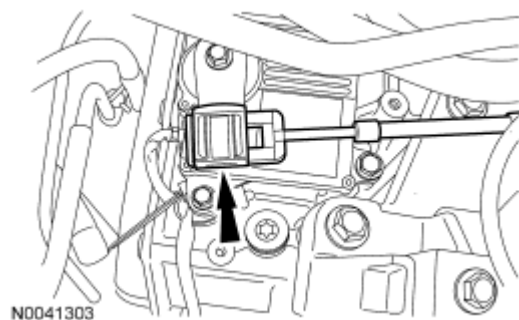
**Fig. 375: Identifying Transmission Control Module Electrical Connector**  
Courtesy of FORD MOTOR CO.

47. Position the selector lever cable in place and install the 2 bolts and the nut.
  - Tighten to 12 Nm (106 lb-in).



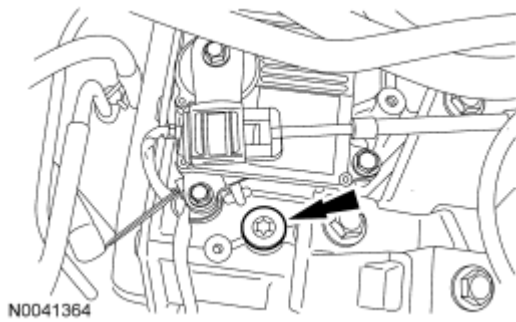
**Fig. 376: Identifying Selector Lever Cable Bracket Bolts & Nuts**  
Courtesy of FORD MOTOR CO.

48. Connect the selector lever cable end.



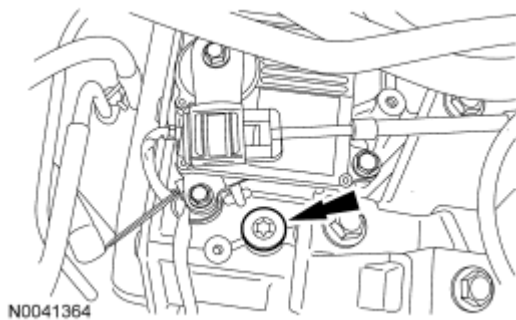
**Fig. 377: Locating Selector Lever Cable End**  
Courtesy of FORD MOTOR CO.

49. Remove the transmission fluid fill plug.



**Fig. 378: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

50. Fill the transaxle with clean transmission fluid.
51. Install the transmission fluid fill plug.
  - Tighten to 39 Nm (29 lb-ft).



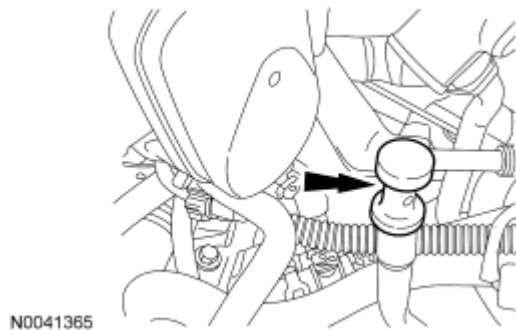
**Fig. 379: Locating Fluid Fill Plug**  
Courtesy of FORD MOTOR CO.

52. Install the upper intake manifold. For additional information, refer to **ENGINE - 3.5L** article.
53. Install the air cleaner and outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING - 2.3L** article or **INTAKE AIR DISTRIBUTION AND FILTERING - 3.0L (4V)** article.
54. Install the battery tray and the battery. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
55. Remove the transmission fluid level indicator and make sure that the transaxle has transmission fluid in it.
56. With the transaxle in PARK, the vehicle on a level surface, the engine at idle (680-780 rpm) and foot pressed on the brake, move the selector lever through each gear and allow engagement of each gear. Place the selector lever back in the PARK position.
57. Wipe the transmission fluid level indicator cap and remove the transmission fluid level indicator.
58. Wipe the transmission fluid level indicator with a clean cloth.

**NOTE:** In order to get an accurate transmission fluid level reading the vehicle should be on a level surface. Idle the engine to reach the normal operating

**temperature. Using the scan tool, verify that the transaxle is at normal operating temperature 60°C-70°C (140°F-158°F), prior to adjusting the transmission fluid level.**

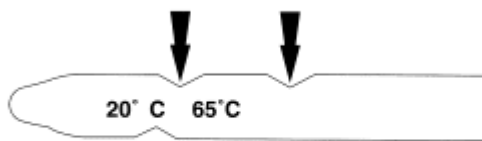
59. If transmission fluid needs to be added, add transmission fluid in 0.25L (1/2 pt) increments through the transmission fluid fill plug located on the top of the transaxle near the transmission fluid level indicator. Do not overfill the transmission fluid. Install the transmission fluid level indicator back in the transmission fluid filler tube until it is fully seated, then remove the indicator. The transmission fluid level should be at the upper most mark on the transmission fluid level indicator. Only fill to the upper most mark on the transmission fluid level indicator. Do not overfill. Damage to the transaxle will occur.



**Fig. 380: Locating Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at normal operating temperature of 60°C-70°C (140°F-158°F) is between the top 2 marks on the transmission fluid level indicator.

60. Fill the transaxle to the correct transmission fluid level.

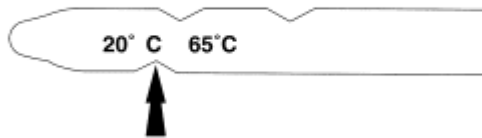


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**Fig. 381: Locating Temperature Marks On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The correct transmission fluid level at cold operating temperature of 15°C-25°C (59°F-77°F) is at the bottom mark on the transmission fluid level indicator.

61. If the Transmission Fluid Temperature (TFT) is low, fill the transaxle with transmission fluid to the cold range on the transmission fluid level indicator. Recheck the transmission fluid level when the transaxle has reached the normal operating temperature.



N0044163

**Fig. 382: Locating Bottom Mark On Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.