

**2008 Ford Edge SE**

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

**2008 TRANSMISSIONS**

**Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX**

**SPECIFICATIONS****MATERIAL SPECIFICATIONS****MATERIAL SPECIFICATIONS**

Item	Specification	Fill Capacity
Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye 164-R3701 (Rotunda)	-	-
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V	9.5L (10 qt)
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B	-

**SOLENOID OPERATION CHART****SOLENOID OPERATION CHART**

Base Selector Lever Position	PCM Commanded Gear	Shift Solenoid					TCC (VFS) NL
		SSA (VFS) NL (CB 1, 2, 3, 4)	SSB (VFS) NH (3, 5, R)	SSC (VFS) NL (CB 2, 6)	SSD (VFS) NH (CB L, R/4, 5, 6)	SSE (On/Off) NC	
P	P	Off	On	Off	Off	On	Off
R	R	Off	Off	Off	Off	On	Off
N	N1	Off	On	Off	On	On	Off
	N2	Off	On	Off	Off	Off	Off
	N3	Off	On	Off	Off	On	Off
D	1	On	On	Off	Off <sup>a</sup>	On <sup>b</sup>	Off
	2	On	On	On	On	Off	Off
	3	On	Off	Off	On	Off	Off
	4	On	On	Off	Off	Off	On/Off
	5	Off	Off	Off	Off	Off	On/Off
	6	Off	On	On	Off	Off	On/Off
L	L	On	On	Off	Off <sup>a</sup>	On <sup>b</sup>	Off

CB = Clutch brake

NC = Normally closed

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NH = Normally high

NL = Normally low

<sup>a</sup> Turns on above 10 km/h (6 mph).

<sup>b</sup> Turns off above 10 km/h (6 mph).

### CLUTCH APPLICATION CHART

### CLUTCH APPLICATION CHART

Gear	Direct (C 3, 5, R)	Overdrive (C 4, 5, 6)	Forward (CB 1, 2, 3, 4)	Low/ Reverse (CB L, R)	Inter-mediate (CB 2, 6)	One-Way
1st			X	X		X
2nd			X		X	O/R
3rd	X		X			O/R
4th		X	X			O/R
5th	X	X				O/R
6th		X			X	O/R
Reverse	X			X		

CB = Clutch brake

O/R = Overrunning

### LINE PRESSURE CHART

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Gear	Line
<b>Pressures at Idle<sup>a</sup></b>	
P	372-413 kPa (54-60 psi)
R	689-724 kPa (100-105 psi)
N	372-413 kPa (54-60 psi)
D	579-600 kPa (84-87 psi)
L	579-600 kPa (84-87 psi)
<b>Pressure at Wide Open Throttle (WOT) Stall<sup>a</sup></b>	
P	372-413 kPa (54-60 psi)
R	1,724-2,068 kPa (250-300 psi)
N	372-413 kPa (54-60 psi)
D	1,655-1,724 kPa (240-250 psi)
L	1,655-1,724 kPa (240-250 psi)

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<sup>a</sup> All pressures are approximate.

### STALL SPEED CHART

### STALL SPEED CHART

Engine	Stall Speed
3.5L	2,350-2,650

### GEAR RATIO CHART

### GEAR RATIO CHART

Gear	Ratio
1st/low	4.484:1
2nd	2.872:1
3rd	1.842:1
4th	1.414:1
5th	1:1
6th	0.742:1
Reverse	2.882:1

### SHIFT SPEEDS

### SHIFT SPEEDS

Throttle Position	Range	Shift	KM/H	MPH
Light Throttle	D	1-2	14-19	9-12
	D	2-3	24-31	15-19
	D	3-4	32-40	20-25
	D	4-5	45-56	28-35
	D	5-6	63-80	39-50
Medium Throttle	D	1-2	37-47	23-29
	D	2-3	58-71	36-44
	D	3-4	74-93	46-58
	D	4-5	108-135	67-84
	D	5-6	169-211	105-131
Heavy Throttle	D	1-2	55-69	34-43
	D	2-3	84-105	52-65
	D	3-4	127-158	79-98
	D	4-5	167-208	104-129
	D	5-6	179-222	111-138

### TORQUE SPECIFICATIONS

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Description	Nm	lb-ft	lb-in

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Air Cleaner (ACL) assembly bracket bolt	11	-	97
ACL outlet pipe clamp	5	-	44
Battery tray bolts	10	-	89
Catalytic converter nuts	40	30	-
Catalytic converter support bracket bolts	20	-	177
Catalytic converter support bracket nut	40	30	-
Driveshaft bolts	70	52	-
Exhaust Y-pipe assembly clamp	40	30	-
Exhaust Y-pipe assembly nuts	40	30	-
Line pressure tap plug	9	-	80
Lower bumper-to-subframe support nuts	10	-	89
Main control cover bolts <sup>a</sup>	12	-	106
Main control valve body bolts <sup>a</sup>	12	-	106
Manual control lever nut	18	-	159
Output Shaft Speed (OSS) sensor bolt	12	-	106
Power steering rack bolts	107	79	-
Power steering rack heat shield bolts	6	-	53
Power Transfer Unit (PTU)-to-transaxle bolts	90	66	-
PTU support bracket bolts	70	52	-
Roll restrictor bolts	90	66	-
Roll restrictor bracket bolts	90	66	-
Roll restrictor heat shield nut	11	-	97
Roll restrictor-to-subframe through bolt	103	76	-
Selector lever cable bracket bolts	12	-	106
Solenoid body bolts <sup>a</sup>	12	-	106
Stabilizer bar bracket bolts	48	35	-
Starter battery terminal	12	-	106
Starter bolts	26	19	-
Starter solenoid terminal	6	-	53
Subframe nuts	150	111	-
Subframe support bracket bolts	103	76	-
Torque converter bolts	55	41	-
Torque converter housing bolts	48	35	-
Transaxle support insulator bolt	55	41	-
Transaxle support insulator bracket nuts	63	46	-
Transaxle support insulator nuts	55	41	-
Transaxle support insulator through bolt	175	129	-
Transmission fluid cooler thermal bypass valve bracket nuts	9	-	80
Transmission fluid cooler tube-to-thermal bypass valve fittings	25	18	-
Transmission fluid cooler tube-to-transaxle case bolts	9	-	80
Transmission fluid drain plug	9	-	80

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Transmission fluid filler tube nut	11	-	97
Turbine Shaft Speed (TSS) sensor bolt	12	-	106

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

## DIAGNOSTIC TESTS

### DIAGNOSTIC STRATEGY

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

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.

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

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

- Appropriate Transaxle articles
- **Introduction - Gasoline Engines** article
- TSBs
- Appropriate SYSTEM 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 add-on items.
- Check selector lever linkage for correct adjustment.
- Check TSB messages regarding the concern.

### Diagnostics

- Carry out On-Board Diagnostic (OBD) procedures Key ON Engine OFF (KOEO) and Key ON Engine Running (KOER).
- Record all DTCs.
- Repair all non-transaxle codes first.

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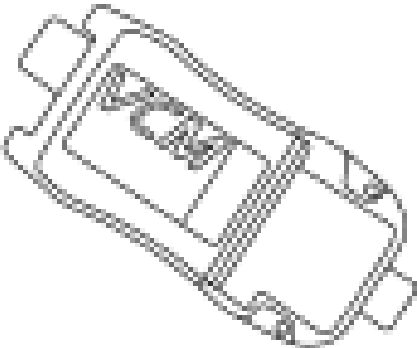
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- Repair all transaxle codes second.
- Erase all continuous codes and attempt to repeat them.
- Repair all continuous codes.
- If only pass codes are obtained, refer to **Diagnosis By Symptom** for further information and diagnosis.

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

### DIAGNOSTIC FLOW CHART

#### Special Tools

Illustration	Tool Name	Tool Number
 <b>ST2834-A</b>	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.
- Verify the concern by operating the vehicle.
- Check the transmission fluid level and condition.
- Check for non-factory-installed items and verify correct installation.
- Check the selector lever linkage adjustments.
- Check TSB messages for vehicle concerns.
- Carry out both Key ON Engine OFF (KOEO) and Key ON Engine Running (KOER) Self Test.
- Record all DTCs.

### DIAGNOSTIC FLOW CHART

Test	Result	Action
1) Were any DTCs recorded?	Yes	REPAIR all hard DTCs. FOLLOW the pinpoint tests. REFER to the <b><u>Introduction -</u></b>

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	No	<b><u>Gasoline Engines</u></b> article first, then this service information, then Go to Step 2. <b><u>REFER to <b>Diagnosis By Symptom</b></u></b> , then Go to Step 5.
2) Are any continuous test memory codes present?	Yes	CLEAR codes and CARRY OUT drive cycle test, then Go to Step 3.
	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 appropriate transmission articles , then this service information, then Go to Step 4.
	No	Go to Step 4.
4) Is the concern repaired?	Yes	CARRY OUT the Key ON Engine OFF (KOEO) and Key ON Engine Running (KOER) self test to verify that no DTCs are present. CLEAR memory codes.
	No	<b><u>REFER to <b>Diagnosis By Symptom</b></u></b> , then Go to Step 5.
5) Are there any electrical concerns?	Yes	INSTALL the scan tool. CARRY OUT KOEO and KOER tests and drive cycle test with the scan tool, then Go to Step 6.
	No	REFER to the hydraulic and

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		mechanical routine to diagnose and repair the concern, then Go to Step 7.
6) 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 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 7.
7) Is the concern repaired?	Yes	CARRY OUT the final quick 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

#### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12	MERCON® V



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(Canada)

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 temperature
- Vehicle driving conditions
- Vehicle loaded/unloaded

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

### Verification of Condition

This article 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 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
- 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

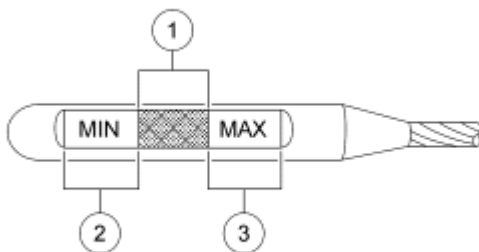
If the vehicle has been operated for an extended period of time at highway speeds, in city traffic, in hot weather or while pulling a trailer, the transmission fluid needs to cool down to obtain an accurate reading.

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

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. With the selector lever in PARK, the engine at idle and 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.
2. Wipe the transmission fluid level indicator cap and remove the transmission fluid level indicator.
3. Wipe the transmission fluid level indicator with a clean cloth.
4. 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 within the normal operating range.



N0061408

**Fig. 1: Identifying Transmission Fluid Indicator**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Correct transmission fluid level at normal operating temperature 80°C-93°C (175° F-200°F)
2	-	Low transmission fluid level
3	-	High transmission fluid level

#### 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.

#### **Transmission Fluid Condition Check**

1. Check the transmission fluid level.
2. Observe the color and the odor. The color under normal circumstances should be dark reddish, 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 transmission fluid, the transaxle must be disassembled and completely cleaned. This includes the torque converter, cooler bypass valve, coolers and cooler tubes.
7. Carry out diagnostic checks and adjustments, refer to **Diagnosis By Symptom**.

#### **Water in Transmission Fluid**

To correctly repair a transmission or transaxle that has had water or coolant introduced into the system, completely disassemble, clean and replace the following parts:

- All internal and external seals
- All friction material; clutches and bands
- Torque converter
- All parts with bonded seals
- All solenoids
- All transmission fluid filters

Prior to installing the transmission or transaxle, the transmission fluid cooler(s), transmission fluid cooler tubes

and transmission fluid cooler hoses need to be flushed and cleaned.

## ROAD TESTING VEHICLE

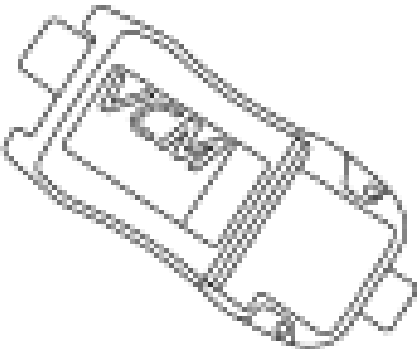
**NOTE:** Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

**NOTE:** If a new or remanufactured transaxle assembly is being installed or a new solenoid body is installed, the PCM will have to be reflashed with a new solenoid body strategy and identification data file. The solenoid body strategy drive cycle should also be carried out. Refer to Solenoid Body Strategy.

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

## SOLENOID BODY STRATEGY

### Special Tools

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

### Solenoid Body Identification Procedure

- Using the scan tool, select Powertrain, Transmission and Transmission Solenoid Body Identification from the toolbox icon and follow the instructions displayed on the scan tool.

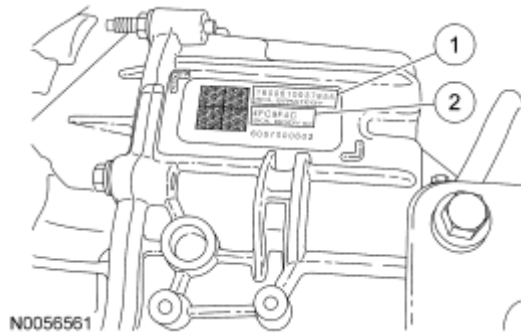
The solenoid body identification screen displays solenoid body identification information:

- Solenoid body identification - 7-digit
- Solenoid body strategy - 13-digit

The next screen displays the current solenoid body identification and strategy data file stored in the PCM. If the solenoid body strategy field is blank, the module contains a partial transmission solenoid body strategy. This is due to a corrupt or missing file at the time the programmable

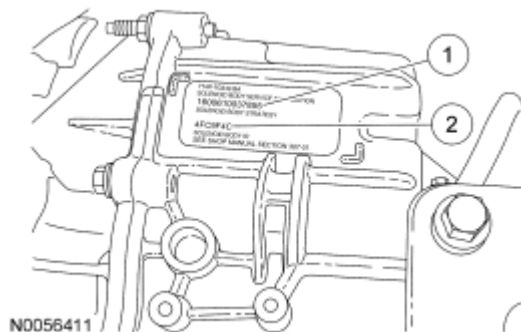
parameters were completed.

2. Compare the solenoid body identification and strategy (if available) to the solenoid body service tag or the replacement solenoid body tag located on top of the transaxle case.



**Fig. 2: Original Solenoid Body Service Tag**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Thirteen-digit solenoid body strategy
2	-	Seven-digit solenoid body identification



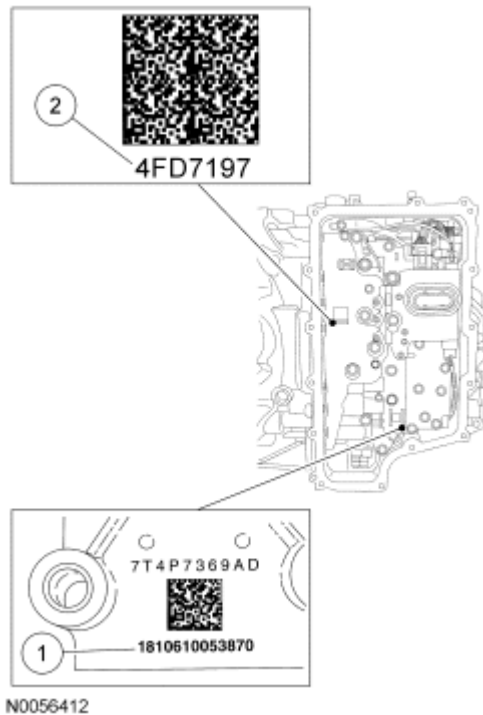
**Fig. 3: Replacement Solenoid Body Service Tag**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Thirteen-digit solenoid body strategy
2	-	Seven-digit solenoid body identification

3. If the solenoid body identification and strategy on the scan tool match the solenoid body service tag or replacement tag, then the solenoid body identification and strategy are correct for this transaxle and a solenoid body strategy download is not required. If the solenoid body service tag or replacement tag is missing or damaged so that it is not readable or does not match the identification or strategy on the scan tool, remove the main control cover, refer to **Main Control Cover**.

The 7-digit identification number and the 13-digit strategy number are stamped on the solenoid body.

**NOTE:** If the solenoid body information does not match the module information, transaxle damage or driveability concerns can occur.



**Fig. 4: Solenoid Body Identification Tag**  
Courtesy of FORD MOTOR CO.

- Inspect the solenoid body identification and strategy stamped on the solenoid body and compare this to the solenoid body service tag on the transaxle case. If the solenoid body identification and strategy stamped on the solenoid body does not match the solenoid body service tag or if the solenoid body identification and strategy stamped on the solenoid body match the solenoid body service tag on the transaxle case but do not match the solenoid body identification and strategy numbers displayed on the scan tool, a solenoid body strategy data download is required.

Item	Part Number	Description
1	-	Thirteen-digit solenoid body strategy
2	-	Seven-digit solenoid body identification

#### Solenoid Body Strategy Data Download

- Using the scan tool, select module programming and programmable parameters under the toolbox icon and select transmission. Follow the instructions displayed on the scan tool.

There are fields to enter the solenoid body 7-digit identification and 13-digit strategy recorded from the solenoid body.

**NOTE:** If the solenoid body information is not correct, transaxle damage or

2. Enter the solenoid body identification and strategy.

The scan tool checks to see if the file is present on the scan tool. If the file is present, the technician may proceed with downloading the file to the PCM. If the file is not present, the scan tool will need to be connected to the Professional Technician Society (PTS) server to download the file onto the scan tool.

3. Verify that the file is present on the scan tool. If the file is present, go to Step 8. If the file is not present, continue with this procedure.
4. Connect the scan tool to the PTS server.

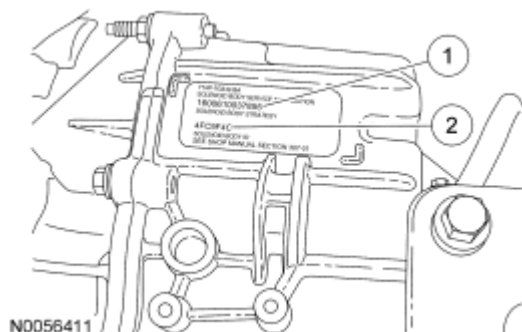
5. Follow the instructions on the network to download the strategy file to the scan tool.

6. If the scan tool cannot connect to the PTS server, download the file from [www.motorcraft.com](http://www.motorcraft.com).

7. Reconnect the scan tool to the vehicle.

8. Follow the instructions displayed on the scan tool.
9. If a new solenoid body was installed, compare the 7-digit identification and the 13-digit strategy fields from the solenoid body to the replacement solenoid body tag provided with the solenoid body service kit and place it over the existing identification tag.

The scan tool will automatically download the strategy file or partial strategy file to the PCM and will display a progress bar while downloading. The scan tool will display a message when it is finished downloading the data that states that the file was downloaded successfully.



**Fig. 5: Replacement Solenoid Body Service Tag**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Thirteen-digit solenoid body strategy
2	-	Seven-digit solenoid body identification

**NOTE:** If a drive cycle is not completed, the customer may feel erratic shifts and driveability concerns.

10. Test drive the vehicle. Refer to Solenoid Body Strategy Drive Cycle.

#### Solenoid Body Strategy Drive Cycle

Carry out the drive cycle after downloading the solenoid body strategy data file to the PCM.

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

**NOTE:** The engine and transaxle must be at normal operating temperature.

1. Bring the transaxle to normal operating temperature.
2. With the engine running and the brake applied, move the selector lever through the gears in the following order, pausing in each gear for 4 seconds: N, R, N, D, R, D, N. Repeat this pattern 2 times. If any engagements feel soft or harsh, repeat this procedure.
3. Drive the vehicle and accelerate at a moderate throttle so that the upshifts occur at 2,000 RPM up to 80 km/h (50 mph) and brake moderately to a stop. Repeat this pattern 2 times.
4. Drive the vehicle and accelerate at a moderate throttle so that the upshifts occur at 3,000 RPM up to 80 km/h (50 mph) and brake moderately to a stop. Repeat this pattern 2 times.
5. With the engine running and the brake applied, move the selector lever through the gears in the following order, pausing in each gear for 4 seconds: N, R, N, D, R, D, N. Repeat this pattern 2 times.

#### SHIFT POINT ROAD TEST

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.

**NOTE:** Shift speed ranges are approximate for all applications. For specific applications (engine, axle ratio and application) refer to the Automatic Transmission Specification Issue available from Ford Customer Service Division.



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3. Apply minimum throttle and observe speeds at which upshift occurs and torque converter engages using the shift speeds chart.

### SHIFT SPEEDS

Throttle Position	Range	Shift	KM/H	MPH
Light Throttle	D	1-2	14-19	9-12
	D	2-3	24-31	15-19
	D	3-4	32-40	20-25
	D	4-5	45-56	28-35
	D	5-6	63-80	39-50
Medium Throttle	D	1-2	37-47	23-29
	D	2-3	58-71	36-44
	D	3-4	74-93	46-58
	D	4-5	108-135	67-84
	D	5-6	169-211	105-131
Heavy Throttle	D	1-2	55-69	34-43
	D	2-3	84-105	52-65
	D	3-4	127-158	79-98
	D	4-5	167-208	104-129
	D	5-6	179-222	111-138

4. With vehicle speed above 43 km/h (27 mph), press accelerator pedal to floor, Wide Open Throttle (WOT). The transaxle should shift from 4th to 3rd, or 4th to 2nd, depending on the vehicle speed. The Torque Converter Clutch (TCC) should release.
5. With vehicle speed above 56 km/h (35 mph), move the selector lever from D (DRIVE) range to L (LOW) range and remove foot from accelerator pedal. The transaxle should immediately downshift to 2nd gear. When vehicle speed drops below 32 km/h (20 mph), the transaxle should downshift into 4th gear.
6. If the transaxle fails to upshift/downshift or TCC does not apply and release, refer to **Diagnostics By Symptom** for possible causes.

### TORQUE CONVERTER DIAGNOSIS

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 Clutch (TCC) Operation Test.
4. Carry out Diagnostic Procedures:
  - Run OBDs. Refer to **Diagnostics**.
  - Repair all non-transmission related DTCs first.
  - Repair all transmission DTCs.

- Rerun OBD 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 installing a new torque converter.

### **Torque Converter Clutch (TCC) Operation Test**

This test verifies that the TCC control system and the torque converter are operating correctly.

1. Carry out Self Test, refer to the tester manual. Check for DTCs.
2. Connect a tachometer to the engine.
3. Bring the engine to normal operating temperature by driving the vehicle at highway speeds for approximately 15 minutes in Overdrive (Circle D) position.
4. If the vehicle stalls in Overdrive (Circle D) at idle with vehicle at a stop, move the selector lever to manual L position. If the vehicle stalls, see torque converter operation concerns, refer to **Diagnosis By Symptom**. Repair as required. If the vehicle does not stall in Overdrive (Circle D), 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 (alternators)
  - 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**.

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- Correct linkage adjustments, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article.

### Selector Lever Linkage Check

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

### Check TSBs

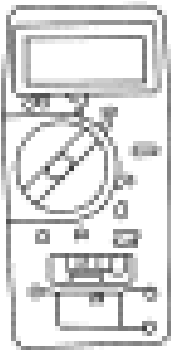
Refer to all TSBs which pertain to the concern and follow the procedure.

**Carry Out On-Board Diagnostic (OBD)s Key ON Engine OFF (KOEO) and Key ON Engine Running (KOER) Self Test.**

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.

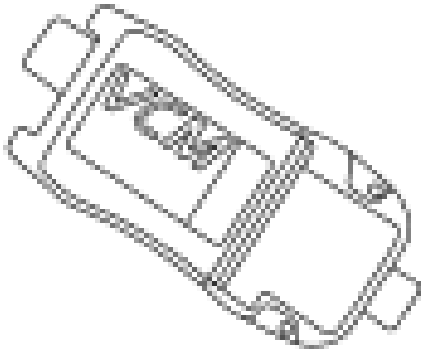
## DIAGNOSTICS

### Special Tools

Illustration	Tool Name	Tool Number
 ST1137-A	73III Digital Multimeter	105-R0057 or equivalent
	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool	

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ST2834-A

### On-Board Diagnostic (OBD) With Scan Tool

**NOTE:** For detailed instruction and other diagnostic methods using the scan tool or equivalent, refer to the scan tool tester manual 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
- Clearing DTCs P1000
- On-Board Diagnostic (OBD) II Drive Cycle
- Other Diagnostic Tool Features

For further information on other diagnostic testing features using the scan tool, refer to the [Introduction - Gasoline Engines](#) article. Other diagnostic methods include the following.

- PID Access Mode
- Freeze Frame Data Access Mode
- Oxygen Sensor Monitor Mode

### OUTPUT STATE CONTROL (OSC) MODE

#### Description

Output state control allows an off-board diagnostic scan tool direct control of specific transaxle components or functions. Output state control allows the technician to control the main functions or components of the transaxle to help the technician more quickly and easily diagnose the transaxle. For example, output state control may be used to change gears or remain in a specific gear. Output state control may be used to control the operation of the Torque Converter Clutch (TCC) to engage or disengage, or to keep the converter clutch from engaging at all. Output state control may also be used to help carry out solenoid electrical pinpoint tests by turning a solenoid off or on by controlling the actual current to the Variable Force Solenoid (VFS) solenoid.

#### Procedure

**NOTE:** Retrieve Continuous Codes and carry out a Key ON Engine OFF (KOEO) and Key ON Engine Running (KOER) Self Test before using any output state control. Any DTCs related to the Transmission Range (TR) sensor, the Output Shaft Speed (OSS) sensor or the Turbine Shaft Speed (TSS) sensor must be fixed or the PCM will not allow the output state control to operate.

Output state control is used to test various transaxle components and functions when the vehicle is either in the service bay or being driven on the road. Specific vehicle conditions are required for output state control to control each specific function or component. The following will describe which transaxle functions and components output state control may control and the specific vehicle conditions necessary for its operation.

#### Service Bay - Vehicle State No. 1

Vehicle state No. 1 is functional ONLY when the key is in the ON position and the vehicle gear selector is in PARK or NEUTRAL with the engine OFF. Vehicle state No. 1 is required when using output state control to carry out electrical pinpoint tests. The following transaxle components may be controlled using output state control in vehicle state No. 1.

- SSA/SS1 - Directs PCM to command Shift Solenoid E (SSE) OFF or ON
- SSD\_AMP - Controls the current to Shift Solenoid D (SSD), VFS
- SSC\_AMP - Controls the current to Shift Solenoid C (SSC), VFS
- SSB\_AMP - Controls the current to Shift Solenoid B (SSB), VFS
- SSA\_AMP - Controls the current to Shift Solenoid A (SSA), VFS
- TCC AMP - Controls the current to the TCC VFS
- PCA AMP - Controls the current to the Line Pressure Control (LPC) VFS

The vehicle requirements must be met when sending an output state control value to control each specific component such as the solenoids stated above. If the vehicle requirements are not met when sending the output state control value, an error message may appear. When the error message appears, output state control is cancelled and should be restarted.

After sending the output state control value, if the vehicle requirements are no longer met, the error message will not appear but the output state control value will be cancelled by the PCM. Use the scan tool to monitor the PID that corresponds to each output state control function or component to determine if the PCM is using the output state control value or normal control.

Output state control may be cancelled at any time, using the scan tool, to return the PCM to normal control for a specific output state control function or component. See instructions for specific scan tool.

### **Service Bay - Vehicle State No. 2**

Vehicle state No. 2 is functional ONLY when the engine is running and the vehicle gear selector is in PARK or NEUTRAL with engine speed greater than 1,100 RPM. Vehicle state No. 2 is required when using output state control to carry out a line pressure check. Most, but not all, of the solenoids may be controlled during this vehicle state. It is recommended to use vehicle state No. 1 when using output state control to control the solenoids. The following transaxle function and components may be controlled using output state control in vehicle state No. 2.

- LINEDSD - Output state control function to command line pressure to a desired pressure
- SSD\_AMP - Controls the current to SSD, VFS
- SSC\_AMP - Controls the current to SSC, VFS
- SSB\_AMP - Controls the current to SSB, VFS
- SSA\_AMP - Controls the current to SSA, VFS

The vehicle requirements must be met when sending an output state control value to control each specific component such as the solenoids stated above. If the vehicle requirements are not met when sending the output state control value, an error message may appear. When the error message appears, output state control is cancelled and should be restarted.

After sending the output state control value, if the vehicle requirements are no longer met, the error message will not appear but the output state control value will be cancelled by the PCM. Use the scan tool to monitor the PID that corresponds to each output state control function or component to determine if the PCM is using the output state control value or normal control.

Output state control may be cancelled at any time, using the scan tool, to return the PCM to normal control for a specific output state control function or component. See instructions for specific scan tool.

Output state control values for SSA\_AMP, SSB\_AMP, SSC\_AMP, SSD\_AMP, PCA AMP and TCC AMP to control the current on the VFS are between zero (0) and one (1) amp. The following are examples.

- 0 - Commands PCM to control current to zero amps
- 0.25 - Commands PCM to control current to 1/4 amp or 250 milli-amps
- 0.50 - Commands PCM to control current to 1/2 amp or 500 milli-amps
- 0.75 - Commands PCM to control current to 3/4 amp or 750 milli-amps
- 1 - Commands PCM to control current to 1 amp or 1,000 milli-amps

Output state control will aid in testing the electronic functions of the PCM, VFS and associated circuitry. Output state control allows the technician to control the PCM commanded current of the VFS and the commanded state of the on/off solenoid. This allows the technician to accurately test the electronic circuitry by comparing the commanded current with the actual current or the on/off state with the actual voltage. Shifting the transmission through the various gears tests the mechanical operation of the VFS. When using output state control to control the VFS current, the technician may measure the circuit current using an inductive pickup or

measure the circuit voltage drop to help verify the proper electrical operation of each VFS solenoid.

The output state control values for LINEDSD to command a desired line pressure are between 414 kPa (60 psi) and 1,931 kPa (280 psi). The following are examples.

- 60 psi - Commands PCM to control line pressure to 414 kPa (60 psi)
- 100 psi - Commands PCM to control line pressure to 689 kPa (100 psi)
- 150 psi - Commands PCM to control line pressure to 965 kPa (150 psi)
- 200 psi - Commands PCM to control line pressure to 1,517 kPa (200 psi)

**NOTE:**        **Do NOT command line pressure LOWER than 414 kPa (60 psi) or HIGHER than 1,931 kPa (280 psi) or damage to the transaxle can occur.**

Output state control allows the technician to control the PCM commanded Line Pressure. This allows the technician to accurately test the electronic pressure control system by comparing the output state control commanded line pressure to the actual line pressure indicated on the pressure gauge. The pressure gauge should be connected to the line pressure tap on the transmission. The PID corresponding to the commanded Line Pressure must be monitored to make sure the PCM is using the output state control value for the commanded Line Pressure. This test will help verify the correct operation of the transmission pump assembly, pump regulator valve and the operation of the LPC solenoid.

#### **Drive Test**

Output state control allows control of 3 transmission functions while driving on the road. Each transmission function has a unique set of vehicle operating requirements that the technician is required to meet before the PCM will allow output state control to operate.

- TCC\_OSC - Commands the PCM to engage or disengage the TCC
- GEAR\_OSC - Commands the PCM to change gears (upshift or down-shift) or remain in a gear
- HRSH\_SFT - Commands a slightly higher hydraulic pressure during engagements and upshifts

The vehicle requirements must be met when sending an output state control value to control the specific functions stated above. If the vehicle requirements are not met when sending the output state control value, an error message may appear. When the error message appears, output state control is cancelled and should be restarted.

After sending the output state control value, if the vehicle requirements are no longer met, the error message will not appear but the output state control value will be cancelled by the PCM. Use the scan tool to monitor the PID that corresponds to each output state control function or component to determine if the PCM is using the output state control value or normal control.

Output state control may be cancelled at any time, using the scan tool, to return the PCM to normal control for a specific output state control function or component. See instructions for specific scan tool.

#### **Drive Test - Torque Converter Clutch Control**

The output state control values for TCC\_OSC to engage or disengage the TCC are as follows:

- 0 - PCM in normal control of TCC and output state control is cancelled
- 1 or OFF - Commands PCM to keep the TCC from engaging
- 2 or ON - Commands PCM to engage the TCC using a normal ramp rate
- 3 or ON - Commands PCM to engage the TCC using a fast ramp rate

Controlling the TCC will assist the technician in testing the operation of the torque converter for engagements and disengagements. Also, the technician may find it easier to evaluate upshifts and downshifts by first using output state control to keep the TCC from engaging.

Vehicle requirements when using TCC\_OSC Controlling the TCC.

When sending the TCC\_OSC value [1 or OFF], the engine must be running with the transaxle in the DRIVE position and the vehicle speed must be greater than 5 km/h (3 mph).

When sending the TCC\_OSC value [2 or 3 or ON], the engine must be running with the selector lever in the DRIVE position, transaxle in 3rd, 4th, 5th or 6th gear, transaxle temperature between 4°C (40°F) and 121°C (250°F), the vehicle speed must be below 24 km/h (15 mph) and engine speed greater than 1,100 RPM with minimal engine load.

#### Drive Test - Upshift and Downshift Control

**NOTE:** Once output state control has successfully commanded the transmission to shift to the desired output state control gear, the transmission will remain in that gear until output state control commands a different gear or the vehicle conditions are no longer correct.

The output state control values for GEAR\_OSC to control the transaxle gear changes are as follows:

- 0 - PCM in normal shift control and output state control is cancelled
- 1 - Commands PCM to shift to 1st gear - no engine braking
- 2 - Commands PCM to shift to 2nd gear - with engine braking
- 3 - Commands PCM to shift to 3rd gear - with engine braking
- 5 - Commands PCM to shift to 5th gear - with engine braking
- 6 - Commands PCM to shift to 6th gear - with engine braking

Controlling the gear changes will assist the technician in testing the various clutches and bands and whether the transmission is slipping in any particular gear. Output state control will command the PCM to upshift or downshift depending on the output state control gear value the technician selects. The transmission will remain in the output state control gear selected until another output state control gear value is sent or until output state control is cancelled and/or the vehicle conditions for using output state control are no longer met.

Vehicle requirements when using GEAR\_OSC Controlling Gear Changes



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When sending a GEAR\_OSC value, the engine must be running with the selector lever in the DRIVE position, and the vehicle speed must be greater than 5 km/h (3 mph).

Additional vehicle conditions required for upshifts:

- Vehicle speed must be greater than 32 km/h (20 mph) when commanding an upshift to 5th or 6th gear

Additional vehicle conditions required for downshifts:

- Vehicle speed must be less than 32 km/h (20 mph) when commanding a downshift to 1st gear
- Vehicle speed must be less than 64 km/h (40 mph) when commanding a downshift to 2nd gear
- Vehicle speed must be less than 97 km/h (60 mph) when commanding a downshift to 3rd gear
- Vehicle speed must be less than 129 km/h (80 mph) when commanding a downshift to 4th gear
- Vehicle speed must be less than 161 km/h (100 mph) when commanding a downshift to 5th gear

### Drive Test - Pressure Added for Engagements and Upshifts

The output state control values for HRSH\_SHFT to command a slight or moderate increase in hydraulic pressure to test for firmer engagements and upshifts are as follows:

- 0 or OFF - PCM in normal pressure control for shifts and engagements and output state control is cancelled
- 1 or ON - Commands PCM to moderately increase hydraulic pressure during engagements and upshifts

Setting HRSH\_SFT to 1 or ON allows the technician to moderately increase the pressure when performing engagements such as P-R, P-D, N-R, N-D, R-D and when performing automatic upshifts. This can provide additional diagnostic information to help the technician determine whether the electronic pressure control system is providing at least limited control (a normal shift would become firmer). Using output state control to control HRSH\_SHFT to 1 or ON should make a softer engagement or shift more normal and an already normal shift or engagement firmer by slightly increasing the pressure. This test should only be used to provide additional diagnostic information and should not be the only scan tool or test to determine a faulty electronic or hydraulic component.

### Using Output State Control and Monitoring PIDs

To confirm that the output state control value was sent by the scan tool and the PCM has accepted the output state control command, a corresponding PID for each output state control parameter must be monitored. After SENDING the output state control value, the corresponding PID value should be the same as the output state control value that was sent. Additional PIDs are listed that may be monitored to help the technician accurately diagnose the transaxle.

The following is a list of output state control parameters and their corresponding PIDs:

Output State Control Parameter	Corresponding PID	Additional PIDs
HRSH_SHFT	HRSH_SHFT	
LINEDSD	LINEDSD	PCA, PCA AMP, PCA_F

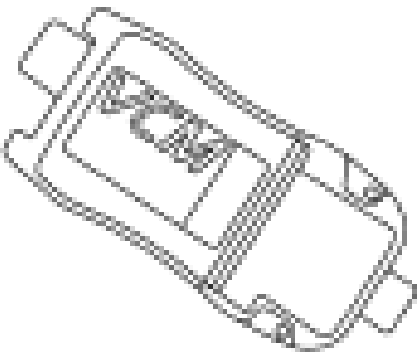
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TCC_OSC	TCC_OSC	TCCRAT, TCCMCMD, TSLIP
GEAR_OSC	GEAR_OSC	SHFT_TYP, GEAR, TRANRAT
SSA_AMP	SSA_AMP	SSPCA, SSPCA_F
SSB_AMP	SSB_AMP	SSPCB, SSPCB_F
SSC_AMP	SSC_AMP	SSPCC, SSPCC_F
SSD_AMP	SSD_AMP	SSPCD, SSPCD_F
PCA AMP	PCA AMP	PCA_F
TCC AMP	TCC AMP	TCCPC, TCCPC_F
SSA/SS1	SSA/SS1	SSA/SS1_F

### DIAGNOSTIC PARAMETERS IDENTIFICATION (PID) CHART

#### Special Tools

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

PID Name	PID Description	Units
TCCPC	Commanded pressure for the Torque Converter Clutch (TCC) Variable Force Solenoid (VFS)	Pressure
TCC AMP	Commanded current for the TCC VFS	Amperes
TCCPC_F	Fault status for the TCC VFS	Fault/No Fault
GEAR	Commanded transaxle gear	P, R, N, 1, 2, 3, 4, 5 and 6
GEAR_RAT	Theoretical transaxle gear ratio	Ratio
TRAN_RAT	Actual transaxle gear ratio	Ratio
LINEDSD	Commanded line pressure	Pressure
PCA	Commanded pressure for the Line Pressure Control (LPC) VFS	Pressure
PCA AMP	Commanded current for the LPC VFS	Amperes
PCA_F	Fault status for the LPC VFS	Fault/No Fault
SSPCA	Commanded pressure for the Shift Solenoid A	Pressure

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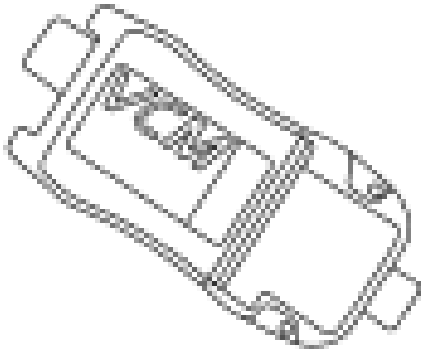
	(SSA)/CB1234 VFS	
SSA_AMP	Commanded current for the SSA/CB1234 VFS	Amperes
SSPCA_F	Fault status for the SSA/CB1234 VFS	Fault/No Fault
SSPCB	Commanded pressure for the Shift Solenoid B (SSB)/C35R VFS	Pressure
SSB_AMP	Commanded current for the SSB/C35R VFS	Amperes
SSPCB_F	Fault status for the SSB/C35R VFS	Fault/No Fault
SSPCC	Commanded pressure for the Shift Solenoid C (SSC)/CB26 VFS	Pressure
SSC_AMP	Commanded current for the SSC/CB26 VFS	Amperes
SSPCC_F	Fault status for the SSC/CB26 VFS	Fault/No Fault
SSPCD	Commanded pressure for the Shift Solenoid D (SSD)/CBLR, C456 VFS	Pressure
SSD_AMP	Commanded current for the SSD/CBLR, C456 VFS	Amperes
SSPCD_F	Fault status for the SSD/CBLR, C456 VFS	Fault/No Fault
SSA/SS1	Commanded state for Shift Solenoid E (SSE)	ON/OFF
SSA/SS1_F	Fault status for SSE	Fault/No Fault
TCC_RAT	Actual speed ratio of torque converter (1.0 = fully engaged)	Ratio
TCC	Commanded torque converter slip (0 = engaged desired)	Ratio
TCC_SLIPACT	Actual difference between engine speed and turbine speed, measured in RPM.	RPM
TSS_SRC	Actual speed of the Turbine Shaft Speed (TSS) Sensor (RPM)	RPM
OSS_SRC	Actual speed of the Output Shaft Speed (OSS) Sensor (RPM)	RPM
TR1	Transmission Range (TR) - Switch 1 actual position	Open/Closed
TR2	TR - Switch 2 actual position	Open/Closed
TR3	TR - Switch 3 actual position	Open/Closed
TR4	TR - Switch 4 actual position	Open/Closed
TCS	Transmission Control Switch (TCS) Position	Depressed/Not Depressed
TFT	Transmission Fluid Temperature (TFT)	Degrees

**TRANSAXLE DRIVE CYCLE TEST****Special Tools**

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

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**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 4 times consecutively for shift error DTC to be set and 5 times consecutively for continuous 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 - 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 transaxle 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 opening steady for minimum of 15 seconds.
5. With transaxle in 6th gear and maintaining steady speed and throttle opening, lightly apply and release brake (to operate stoplamps). Then hold speed and throttle steady for additional 5 seconds minimum.
6. Brake to a stop and remain stopped for minimum of 20 seconds.
7. Repeat Steps 4 through 6 at least 5 times.
8. 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 drive cycle, 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** in this article check TSBs for diagnostic concern.

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### After On-Board Diagnostic (OBD)

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

After the OBD 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

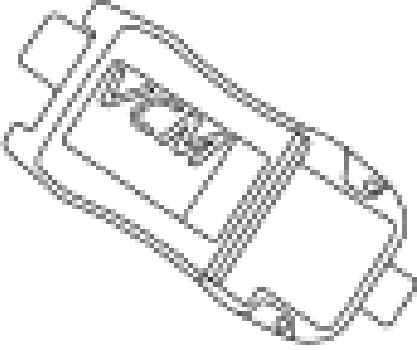
**NOTE:** Prior to entering pinpoint tests, check the PCM wiring harness for correct connections, bent or broken pins, corrosion, loose wires, correct routing, correct seals and their condition. Check the PCM, sensors and actuators for damage. Refer to the **Introduction - Gasoline Engines** article.

**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 OBDs, 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

### Special Tools

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

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### DTC CHART

DTC	Grouping	Component	Description	Condition	Symptom	
P0657	-	Transaxle Solenoid Power Control	Transaxle solenoid power control electrical circuit failure.	Transaxle solenoid power control provides power to all the solenoids. This DTC sets if the transaxle solenoid power control circuit is open.	<ul style="list-style-type: none"> <li>No voltage to solenoids.</li> <li>Defaults to 5th gear.</li> <li>Only REVERSE and NEUTRAL available.</li> <li>Will turn on Malfunction Indicator Lamp (MIL).</li> </ul>	Go to <b><u>Pin</u></b>
P0705	P0705, P1702	Transmission Range (TR)	TR sensor circuit failure.	PCM is received an invalid combination of the 4-bit signal from the TR sensor.	<ul style="list-style-type: none"> <li>Possible no crank.</li> <li>Only PARK, REVERSE, NEUTRAL and 5th gear available.</li> <li>Harsh engagements.</li> <li>Extremely delayed engagements (until a DTC is set).</li> <li>After a DTC is set and the high side opened. <ul style="list-style-type: none"> <li>Harsh engagements.</li> <li>Poor performance (due to a 5th gear drive away).</li> <li>No shifts.</li> </ul> </li> <li>Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0706	P0706, P0709	TR Sensor	TR sensor range failure.	TR sensor A circuit range/performance. TR sensor stuck in transition zone (possible wiring, connector or TR sensor issue).	<ul style="list-style-type: none"> <li>Possible no crank.</li> <li>Only PARK, REVERSE, NEUTRAL and 5th gear available.</li> <li>Harsh engagements.</li> <li>Extremely delayed</li> </ul>	Go to <b><u>Pin</u></b>

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					<p>engagements (until a DTC is set).</p> <ul style="list-style-type: none"> <li>• After a DTC is set and the high side opened. <ul style="list-style-type: none"> <li>○ Harsh engagements.</li> <li>○ Poor performance (due to a 5th gear drive away).</li> <li>○ No shifts.</li> </ul> </li> <li>• Will turn on MIL.</li> </ul>	
P0708	P0708, P1702	TR Sensor	TR sensor circuit failure.	PCM is received all 4 TR sensor bits open (potential sensor disconnected, wiring, connector or TR sensor issue).	<ul style="list-style-type: none"> <li>• Possible no crank.</li> <li>• Only PARK, REVERSE, NEUTRAL and 5th gear available.</li> <li>• Harsh engagements.</li> <li>• Extremely delayed engagements (until a DTC is set).</li> <li>• After a DTC is set and the high side opened. <ul style="list-style-type: none"> <li>○ Harsh engagements.</li> <li>○ Poor performance (due to a 5th gear drive away).</li> <li>○ No shifts.</li> </ul> </li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0709	P0709 or P0706, P0709	TR Sensor	TR sensor range failure.	TR sensor A circuit range/performance. TR sensor stuck in transition zone (possible wiring, connector or TR sensor issue).	<ul style="list-style-type: none"> <li>• Possible no crank.</li> <li>• Only PARK, REVERSE, NEUTRAL and 5th gear available.</li> <li>• Harsh engagements.</li> </ul>	Go to <b><u>Pin</u></b>

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					<ul style="list-style-type: none"> <li>Extremely delayed engagements (until a DTC is set).</li> <li>After a DTC is set and the high side opened. <ul style="list-style-type: none"> <li>Harsh engagements.</li> <li>Poor performance (due to a 5th gear drive away).</li> <li>No shifts.</li> </ul> </li> <li>Will turn on wrench lamp.</li> </ul>	
P0710	-	Transmission Fluid Temperature (TFT)	TFT sensor circuit voltage input too low or too high.	<ul style="list-style-type: none"> <li>TFT sensor input indicates a short to ground or an open circuit (could be a wiring, connector or sensor issue).</li> <li>Also see P0712 and P0713.</li> </ul>	<ul style="list-style-type: none"> <li>Torque Converter Clutch (TCC) and stabilized shift schedule may be enabled sooner after cold start.</li> <li>Harsh or soft shifts.</li> <li>Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0710	P0710, P0712	TFT	TFT sensor circuit voltage input too low.	TFT sensor input indicates a short to ground or an open circuit (could be a wiring, connector or sensor issue).	<ul style="list-style-type: none"> <li>TCC and stabilized shift schedule may be enabled sooner after cold start.</li> <li>Harsh or soft shifts.</li> <li>Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0710	P0710, P0713	TFT	TFT sensor circuit voltage too high.	TFT sensor input indicates a short to ground or an open circuit (could be a wiring, connector or sensor issue).	<ul style="list-style-type: none"> <li>TCC and stabilized shift schedule may be enabled sooner after cold start.</li> <li>Harsh or soft shifts.</li> <li>Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0711	-	TFT	No change in TFT sensor input.	PCM has detected no TFT change at low-range or high-range during operation.	<ul style="list-style-type: none"> <li>TCC and stabilized shift schedule may be enabled sooner after a cold start.</li> </ul>	Go to <b><u>Pin</u></b>



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					<ul style="list-style-type: none"> <li>• Harsh or soft shifts.</li> <li>• Will turn on wrench lamp.</li> </ul>	
P0712	P0710, P0712	TFT	TFT sensor circuit voltage input too low.	TFT sensor input indicates a short to ground or an open circuit (could be a wiring, connector or sensor issue).	<ul style="list-style-type: none"> <li>• TCC and stabilized shift schedule may be enabled sooner after cold start.</li> <li>• Harsh or soft shifts.</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0713	P0710, P0713	TFT	TFT sensor circuit voltage too high.	TFT sensor input indicates a short to ground or an open circuit (could be a wiring, connector or sensor issue).	<ul style="list-style-type: none"> <li>• TCC and stabilized shift schedule may be enabled sooner after cold start.</li> <li>• Harsh or soft shifts.</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0715	P0715, P0717	Turbine Shaft Speed (TSS) Sensor	Insufficient input from TSS sensor.	<ul style="list-style-type: none"> <li>• PCM has detected TSS sensor signal failed to 0 speed when vehicle conditions (mainly output speed) indicate TSS sensor output should be present.</li> <li>• Electrical failures (open, short) of the TSS sensor wiring, connector or a failure of the sensor itself will cause this failure.</li> </ul>	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action opens transaxle solenoid power control (removes power from all solenoids). <ul style="list-style-type: none"> <li>○ Provides PARK, REVERSE, NEUTRAL and 5th gear with maximum line pressure and open TCC available (controlled by the manual lever).</li> </ul> </li> <li>• Harsh engagements (due to maximum line pressure).</li> <li>• Poor launch performance (due to 5th gear drive</li> </ul>	Go to <b><u>Pin</u></b>

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					away).	
					<ul style="list-style-type: none"> <li>Will turn on MIL.</li> </ul>	
P0717	P0717 or P0715, P0717	TSS	Insufficient input from TSS sensor.	<ul style="list-style-type: none"> <li>PCM has detected TSS sensor signal failed to 0 speed when vehicle conditions (mainly output speed) indicate TSS sensor output should be present.</li> <li>Electrical failures (open, short) of the TSS sensor wiring, connector or a failure of the TSS sensor itself will cause this failure.</li> </ul>	<ul style="list-style-type: none"> <li>Failure Mode Effects Management action opens transaxle solenoid power control (removes power from all solenoids).                             <ul style="list-style-type: none"> <li>Provides PARK, REVERSE, NEUTRAL and 5th gear with maximum line pressure and open TCC available (controlled by the manual lever).</li> </ul> </li> <li>Harsh engagements (due to maximum line pressure).</li> <li>Poor launch performance (due to 5th gear drive away).</li> <li>Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0718	-	TSS	TSS signal intermittent.	PCM has detected an erratic or no TSS signal.	Will turn on wrench lamp.	Go to <b><u>Pin</u></b>
P0720	P0720, P0722	Output Shaft Speed (OSS) Sensor	Insufficient input from OSS sensor.	<ul style="list-style-type: none"> <li>PCM has detected OSS sensor signal failed to 0 speed when vehicle conditions (mainly turbine speed) indicate</li> </ul>	<ul style="list-style-type: none"> <li>Failure Mode Effects Management action opens transaxle solenoid power control (removes power from all solenoids).</li> </ul>	Go to <b><u>Pin</u></b>

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				<p>OSS sensor output should be present.</p> <ul style="list-style-type: none"> <li>Electrical failures (open, short) of the OSS sensor wiring, connector or a failure of the OSS sensor itself will cause this failure.</li> </ul>	<ul style="list-style-type: none"> <li>provides PARK, REVERSE, NEUTRAL and 5th gear with maximum line pressure and open TCC available (controlled by the manual lever).</li> <li>Harsh engagements (due to maximum line pressure).</li> <li>Poor launch performance (due to 5th drive away).</li> <li>Will turn on MIL.</li> </ul>	
P0721	-	OSS	OSS sensor signal noisy.	PCM has detected an erratic or no OSS sensor signal.	Will turn on wrench lamp.	Go to <b><u>Pin</u></b>
P0722	P0722 or P0720, P0722	OSS	Insufficient input from OSS sensor.	<ul style="list-style-type: none"> <li>PCM has detected OSS sensor signal failed to 0 speed when vehicle conditions (mainly turbine speed) indicate OSS output should be present.</li> <li>Electrical failures (open, short) of the OSS sensor wiring, connector or a failure of the sensor itself will cause this failure.</li> </ul>	<ul style="list-style-type: none"> <li>Failure Mode Effects Management action opens transaxle solenoid power control (removes power from all solenoids).                             <ul style="list-style-type: none"> <li>Provides PARK, REVERSE, NEUTRAL and 5th gear with maximum line pressure and open TCC available (controlled by the</li> </ul> </li> </ul>	Go to <b><u>Pin</u></b>

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					<p>manual lever).</p> <ul style="list-style-type: none"> <li>• Harsh engagements (due to maximum line pressure).</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• Will turn on wrench lamp.</li> </ul>	
P0729	P0729, P0734, P0735 or P0729, P0734, P0735, P0766	Overdrive Clutch System Faults (includes non-electrical Shift Solenoid D (SSD) faults, main control valve body and clutch)	SSD stuck off (SSD or main control valve body).	<p>Sixth gear ratio error. SSD stuck off, both low/reverse clutch and overdrive clutch failed off. This code sets for:</p> <ul style="list-style-type: none"> <li>• Low/reverse clutch/overdrive clutch Variable Force Solenoid (VFS) non-electrical fault.</li> <li>• Low/reverse clutch/overdrive clutch regulator valve stuck in default position.</li> <li>• Low/reverse clutch/overdrive clutch boost valve stuck in default position.</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice flares or neutral conditions on shifts into 4th, 5th or 6th gears.</li> <li>• Customer might notice erratic shifting, flares, neutral conditions while the code is being set.</li> <li>• First gear with engine braking.</li> <li>• Fourth, 5th and 6th gears are disabled.</li> <li>• Also might get delayed or no reverse engagement (need low/reverse clutch on to achieve reverse).</li> <li>• Customer might notice high engine speeds (since 3rd gear is the highest available gear).</li> <li>• Will turn on wrench lamp.</li> </ul>	Refer to <u>I</u>
P072C	-	Low/Reverse Clutch and One-Way Clutch (OWC) Faults (covers just the	Low/reverse clutch or OWC failed on.	<ul style="list-style-type: none"> <li>• Low/reverse clutch or OWC failed on (transmits torque both directions).</li> </ul>	<p>Customer might notice:</p> <ul style="list-style-type: none"> <li>• Decelerations on attempted upshifts (since tie-ups occur).</li> </ul>	Refer to <u>I</u>

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		clutches)		<ul style="list-style-type: none"> <li>1st gear is the only available gear with this failure.</li> </ul>	<ul style="list-style-type: none"> <li>Stuck in 1st gear.</li> <li>High engine RPM.</li> <li>Low maximum vehicle speed.</li> <li>No TCC apply.</li> <li>Will turn on wrench lamp.</li> </ul>	
P072E	P072E, P073A or P072E, P073A, P0757	Direct Clutch System Faults	Shift Solenoid B (SSB) failed on.	<p>The codes:</p> <ul style="list-style-type: none"> <li>P072E Stuck in 3rd gear.</li> <li>P073A Stuck in 5th gear.</li> </ul> <p>These codes set together mean SSB is failed on, causing the direct clutch to be stuck on, 3rd and 5th gear are the only available gears. Since the hydraulic controls prevent direct clutch and low/reverse clutch on together in the forward ranges, the solenoid can be isolated from the clutch. These codes set if:</p> <ul style="list-style-type: none"> <li>Non-electrical failures where SSB (direct clutch VFS) is stuck on (pressure).</li> <li>Direct clutch regulator valve stuck in spring compress position.</li> </ul>	<ul style="list-style-type: none"> <li>Customer may notice a vehicle deceleration on a shift into 2nd, 4th or 6th gears (direct clutch failing to release will cause a tie-up in these gears).</li> <li>Customer might notice a harsh 1-3 shift.</li> <li>Customer might notice erratic shifting while the test is confirming direct clutch is failed on.</li> <li>After a code is stored, all gears but 3rd and 5th gear are disabled.</li> <li>Since only 3rd and 5th gears are allowed, the customer might notice poor launch performance, lack of shifts and harsh engagements.</li> <li>Will turn on wrench lamp.</li> </ul>	Refer to <u>I</u>
P072F	P072F, P073A, P073B or	Overdrive Clutch System Faults (includes non-electrical	Overdrive clutch failed on (clutch, SSD or main control	<p>The codes:</p> <ul style="list-style-type: none"> <li>P072F stuck in 4th gear.</li> </ul>	<ul style="list-style-type: none"> <li>Customer may notice a vehicle deceleration on a shift into 2nd or</li> </ul>	Refer to <u>I</u>

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	P072F, P073A, P073B, P0767	SSD faults, main control valve body and clutch)	valve body).	<ul style="list-style-type: none"> <li>• P073A stuck in 5th gear.</li> <li>• P073B stuck in 6th gear.</li> </ul> <p>Set together to indicate the overdrive clutch is failed on. Overdrive clutch failed on, could be due to:</p> <ul style="list-style-type: none"> <li>• Low/reverse clutch/overdrive clutch VFS (SSD) non-electrical failed stuck on (pressure).</li> <li>• Overdrive clutch stuck on due to mechanical failure.</li> <li>• Low/reverse clutch, overdrive clutch regulator valve stuck in the spring compressed position.</li> </ul>	<p>3rd gear (overdrive clutch failing to release will cause a tie-up in 2nd or 3rd gears).</p> <ul style="list-style-type: none"> <li>• Customer might notice harsh engagements, erratic shifting.</li> <li>• First gear with engine braking, 1st gear without engine braking, 2nd and 3rd gears are disabled.</li> <li>• Poor launch due to 4th gear drive away.</li> <li>• Harsh engagements.</li> <li>• Will turn on wrench lamp.</li> </ul>	
P0733	P0733, P0735 or P0733, P0735, P0756	Direct Clutch System Faults (includes non-electrical SSB faults, valve body and clutch)	Direct clutch failed off.	<p>The codes:</p> <ul style="list-style-type: none"> <li>• P0733 - 3rd gear ratio error.</li> <li>• P0735 - 5th gear ratio error.</li> </ul> <p>Set together if direct clutch is detected failed off. Direct clutch failed off, could be due to:</p> <ul style="list-style-type: none"> <li>• Non-electrical failures where</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice flares or neutral conditions on shifts into 3rd or 5th gears.</li> <li>• PCM will command 3 shifts into 3rd or 5th gear and if the direct clutch is failed off the customer will notice flares or neutral conditions that last one second or so.</li> <li>• Third and 5th gear</li> </ul>	Refer to <b>I</b>

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				<p>SSB (direct clutch VFS) is stuck off (no pressure).</p> <ul style="list-style-type: none"> <li>• Direct clutch regulator valve stuck in default position.</li> <li>• Direct clutch mechanical failure.</li> </ul>	<p>are disabled, customer might notice transmission hangs in 2nd gear on acceleration until customer tips out to closed pedal (done to protect overdrive clutch).</p> <ul style="list-style-type: none"> <li>• Will turn on wrench lamp.</li> </ul>	
P0734	P0729, P0734, P0735 or P0729, P0734, P0735, P0766	Overdrive Clutch System Faults (includes non-electrical SSD faults, valve body and clutch)	SSD stuck off (SSD or valve body).	<p>The codes:</p> <ul style="list-style-type: none"> <li>• P0734 - 4th gear ratio error.</li> <li>• P0735 - 5th gear ratio error.</li> <li>• P0729 - 6th gear ratio error.</li> </ul> <p>Set together mean SSD is stuck off (see P0766 for details).</p>	<ul style="list-style-type: none"> <li>• Customer may notice flares or neutral conditions on shifts into 4th, 5th or 6th gears.</li> <li>• Customer might notice erratic shifting, flares, neutral conditions while the code is being set.</li> <li>• First gear with engine braking, 4th, 5th and 6th gears are disabled.</li> <li>• Customer might notice high engine speeds (since 3rd gear is highest available gear).</li> <li>• Also might get delayed or no REVERSE engagement (need low/reverse clutch on to achieve reverse).</li> <li>• Will turn on wrench lamp.</li> </ul>	Refer to <u>I</u>
P0735	P0729, P0734, P0735 or P0729,	Overdrive Clutch System Faults (includes non-electrical SSD faults,	SSD stuck off (SSD or valve body).	SSD stuck off, both low/reverse clutch and overdrive clutch failed off. This code sets for:	<ul style="list-style-type: none"> <li>• Customer may notice flares or neutral conditions on shifts into 4th, 5th or 6th gears.</li> </ul>	Refer to <u>I</u>

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	P0734, P0735, P0766	valve body and clutch)		<ul style="list-style-type: none"> <li>• Low/reverse clutch/overdrive clutch VFS non-electrical fault.</li> <li>• Low/reverse clutch/overdrive clutch regulator valve stuck in default position.</li> <li>• Low/reverse clutch/overdrive clutch boost valve stuck in default position.</li> </ul> <p>Set together mean SSD is stuck off (see P0766 for details).</p>	<ul style="list-style-type: none"> <li>• Customer might notice erratic shifting, flares, neutral conditions while the code is being set.</li> <li>• 1st gear with engine braking, 4th, 5th and 6th gears are disabled.</li> <li>• Customer might notice high engine speeds (since 3rd gear is highest available gear).</li> <li>• Also might get delayed or no reverse engagement (need low/reverse clutch on to achieve reverse).</li> <li>• Will turn on wrench lamp.</li> </ul>	
P0735	P0733, P0735 or P0733, P0735, P0756	Direct Clutch System Fault (includes non-electrical SSB faults, valve body and clutch)	Direct clutch failed off.	<p>The codes:</p> <ul style="list-style-type: none"> <li>• P0733 - 3rd gear ratio error.</li> <li>• P0735 - 5th gear ratio error.</li> </ul> <p>Set together if direct clutch is detected failed off. Direct clutch failed off, could be due to:</p> <ul style="list-style-type: none"> <li>• Non-electrical failures where SSB (direct clutch VFS) is stuck off (no pressure).</li> <li>• Direct clutch regulator valve stuck in default</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice flares or neutral conditions on shifts into 3rd or 5th gears.</li> <li>• PCM will command 3 shifts into 3rd or 5th gear and if the direct clutch is failed off the customer will notice flares or neutral conditions that last approximately one second.</li> <li>• Third and 5th gears are disabled.</li> <li>• Customer might notice transmission hangs in 2nd gear on acceleration</li> </ul>	Refer to <u>I</u>



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				<p>position.</p> <ul style="list-style-type: none"> <li>• Direct clutch mechanical failure.</li> </ul>	<p>until customer tips out to closed pedal (done to protect the overdrive clutch).</p> <ul style="list-style-type: none"> <li>• Will turn on wrench lamp.</li> </ul>	
P073A	P072F, P073A, P073B or P072F, P073A, P073B, P0767	Overdrive Clutch System Faults (includes non-electrical SSD faults, main control valve body and clutch)	Overdrive clutch failed on (clutch, SSD or main control valve body).	<p>Overdrive clutch failed on, could be due to:</p> <ul style="list-style-type: none"> <li>• P072F - stuck in 4th gear.</li> <li>• P073A - stuck in 5th gear.</li> <li>• P073B - stuck in 6th gear.</li> </ul> <p>Set together to indicate the overdrive clutch is failed on.</p> <p>Overdrive clutch failed on, could be due to:</p> <ul style="list-style-type: none"> <li>• Low/reverse clutch, overdrive clutch, VFS (SSD) non-electrical failed stuck on (pressure).</li> <li>• Overdrive clutch stuck on due to mechanical failure.</li> <li>• Low/reverse clutch, overdrive clutch regulator valve stuck in the spring compressed position.</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice a vehicle deceleration on a shift into 2nd or 3rd gear (overdrive clutch failing to release will cause a tie-up in 2nd or 3rd gear).</li> <li>• Customer might notice harsh engagements, erratic shifting).</li> <li>• 1st gear with engine braking, 1st gear without engine braking, 2nd and 3rd gears are disabled.</li> <li>• Poor launch due to 4th gear drive away.</li> <li>• Harsh engagements.</li> <li>• Will turn on wrench lamp.</li> </ul>	Refer to <u>I</u>
P073A	P072E, P073A or P072E, P073A,	Direct Clutch System Faults	SSB failed on.	<p>The codes:</p> <ul style="list-style-type: none"> <li>• P072E - stuck in 3rd gear.</li> <li>• P073A - stuck in</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice a vehicle deceleration on a shift into 2nd, 4th or 6th gears (direct</li> </ul>	Refer to <u>I</u>

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	P0757			<p>5th gear.</p> <p>These codes set together mean SSB is failed on, causing the direct clutch to be stuck on, 3rd and 5th gear are the only available gears. Since the hydraulic controls prevent direct clutch and low/reverse clutch on together in the forward ranges, the solenoid can be isolated from the clutch. These codes set if:</p> <ul style="list-style-type: none"> <li>• non-electrical failures where SSB (direct clutch VFS) is stuck on (pressure).</li> <li>• Direct clutch regulator valve stuck in spring compress position.</li> </ul>	<p>clutch failing to release will cause a tie-up in these gears).</p> <ul style="list-style-type: none"> <li>• Customer might notice a harsh 1-3 shift.</li> <li>• Customer might notice erratic shifting while the test is confirming direct clutch is failed on.</li> <li>• After a code is stored, all gears but 3rd and 5th are disabled.</li> <li>• Since only 3rd and 5th gears are allowed, the customer might notice poor launch performance, lack of shifts and harsh engagements.</li> <li>• Will turn on wrench lamp.</li> </ul>	
P073B	P072F, P073A, P073B or P072F, P073A, P073B, P0767	Overdrive Clutch System Faults (includes non-electrical SSD faults, valve body and clutch)	Overdrive clutch failed on (clutch, SSD or valve body).	<p>Overdrive clutch failed on, could be due to:</p> <ul style="list-style-type: none"> <li>• P072F - stuck in 4th gear.</li> <li>• P073A - stuck in 5th gear.</li> <li>• P073B - stuck in 6th gear.</li> </ul> <p>Set together to indicate overdrive clutch is failed on. Overdrive clutch failed on, could be due to:</p> <ul style="list-style-type: none"> <li>• Low/reverse</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice a vehicle deceleration on a shift into 2nd or 3rd gears (overdrive clutch failing to release will cause a tie-up in 2nd or 3rd gears).</li> <li>• Customer might notice harsh engagements, erratic shifting.</li> <li>• 1st gear with engine braking, 1st gear without engine braking, 2nd and</li> </ul>	Refer to <u>I</u>

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				<p>clutch, overdrive clutch, VFS (SSD) non-electrical failed stuck on (pressure).</p> <ul style="list-style-type: none"> <li>Overdrive clutch stuck on due to mechanical failure.</li> <li>Low/reverse clutch/overdrive clutch regulator valve stuck in the spring compressed position.</li> </ul>	<p>3rd gears are disabled.</p> <ul style="list-style-type: none"> <li>Poor launch due to 4th gear drive away.</li> <li>Harsh engagements.</li> <li>Will turn on wrench lamp.</li> </ul>	
P0740	P0740, P0743	TCC Solenoid Electrical Faults	TCC circuit is open.	Open circuit in solenoid or wiring.	<ul style="list-style-type: none"> <li>TCC failed off - vehicle might run hotter, lose fuel economy.</li> <li>Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0741	P0741, P1744	TCC System Faults (includes TCC, main control valve body and non-electrical solenoid faults)	TCC failed off.	TCC is mechanically stuck off.	<p>P0741 and P1744 mean the same thing: a non-electrical failure that caused the TCC to fail to apply. This code sets for:</p> <ul style="list-style-type: none"> <li>Non-electrical TCC solenoid stuck off.</li> <li>TCC mechanical failure.</li> <li>TCC regulator apply valve stuck in TCC release position.</li> <li>TCC control valve stuck in TCC release position.</li> <li>TCC functional failure MIL code.</li> <li>TCC failed to apply (less than 80 RPM slip error lasting at</li> </ul>	Refer to <b><u>I</u></b>

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					<p>least 3 seconds when TCC is commanded on) 3 consecutive times.</p> <ul style="list-style-type: none"> <li>• Will turn on MIL.</li> </ul>	
P0742	P0742, P0743	TCC Solenoid Electrical Faults	TCC circuit is shorted to ground.	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action opens the transaxle solenoid power control, removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th gear as the only forward gear with TCC open).</li> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0743	-	TCC Solenoid Electrical Faults	TCC is open, shorted to ground or shorted to voltage.	Open, short to ground or short to power in solenoid or wiring.	<ul style="list-style-type: none"> <li>• See P0740, P0742 or P0744.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0743	P0740, P0743	TCC Solenoid Electrical Faults	TCC circuit is open.	Open circuit in solenoid or wiring.	<ul style="list-style-type: none"> <li>• TCC failed off - vehicle might run hotter, lose fuel economy.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0743	P0742, P0743	TCC Solenoid Electrical Faults	TCC circuit is shorted to ground.	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action opens the transaxle solenoid power control, removing</li> </ul>	Go to <b><u>Pin</u></b>

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					<p>power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th gear as the only forward gear with TCC open).</p> <ul style="list-style-type: none"> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on wrench lamp.</li> </ul>	
P0743	P0743, P0744	TCC Solenoid Electrical Faults	TCC is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>• TCC failed off - vehicle might run hotter, lose fuel economy.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0744	P0743, P0744	TCC Solenoid Electrical Faults	TCC is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>• TCC failed off - vehicle might run hotter, lose fuel economy.</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0748	-	Line Pressure Control (LPC) Solenoid Electrical Faults	LPC is open circuit, shorted to ground or shorted to voltage.	Open, short to ground or short to power in solenoid or wiring.	<ul style="list-style-type: none"> <li>• See P0960, P0962 and P0963.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0748	P0748, P0960	LPC Solenoid Electrical Faults	LPC circuit is open.	Open circuit in solenoid or wiring.	<ul style="list-style-type: none"> <li>• Failed to maximum line pressure - harsh engagements.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0748	P0748, P0962	LPC Solenoid Electrical Faults	LPC circuit is shorted to ground.	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>• Failed to minimum line pressure.</li> <li>• Failure Mode Effects Management action</li> </ul>	Go to <b><u>Pin</u></b>

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					<p>opens the transaxle solenoid power control, removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th as the only forward gear with TCC open).</p> <ul style="list-style-type: none"> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on wrench lamp.</li> </ul>	
P0748	P0748, P0963	LPC Solenoid Electrical Faults	LPC is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>• Failed to maximum line pressure - harsh engagements.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0750	P0750, P0753	Shift Solenoid A (SSA) Electrical Faults	SSA circuit is open.	Open circuit in solenoid or wiring.	<ul style="list-style-type: none"> <li>• Forward clutch is failed off - 5th and 6th gears only available forward gears.</li> <li>• Neutral condition or flare when fault occurs.</li> <li>• Poor launch due to 5th gear drive away.</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0751	P0751, P2700	Forward Clutch System Faults (includes non-electrical SSA faults, valve body and clutch)	Forward clutch failed off.	<p>Forward clutch failed off, could be due to:</p> <ul style="list-style-type: none"> <li>• Forward clutch VFS (SSA) non-electrical failed stuck off (no</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice neutral conditions or flares on downshifts from 5th or 6th gears as the test is determining</li> </ul>	Refer to <b><u>I</u></b>

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				<p>pressure).</p> <ul style="list-style-type: none"> <li>• Forward clutch stuck off due to mechanical failure.</li> <li>• Forward clutch regulator valve stuck in the default position.</li> <li>• Forward clutch boost valve stuck in the default position.</li> </ul>	<p>forward is failed off.</p> <ul style="list-style-type: none"> <li>• Once a code is stored, all gears with forward on are disabled - leaving 5th and 6th gears as the only forward gears.</li> <li>• Customer might notice erratic shifting, harsh engagements, neutral conditions, flares, poor launch performance (due to 5th gear drive away), harsh reverse engagements.</li> <li>• Will turn on MIL.</li> </ul>	
P0752	P0752, P2700	Forward Clutch System Faults (includes non-electrical SSA faults, valve body and clutch)	Forward clutch failed on.	<p>Forward clutch failed on, could be due to:</p> <ul style="list-style-type: none"> <li>• Forward clutch VFS (SSA) non-electrical failed stuck on (pressure).</li> <li>• Forward clutch stuck on due to mechanical failure.</li> <li>• Forward clutch regulator valve stuck in the default position.</li> <li>• Forward clutch regulator valve stuck in the spring compressed position.</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice a vehicle deceleration on a shift into 5th or 6th (forward clutch failing to release will cause a tie-up in 5th or 6th).</li> <li>• Customer might notice erratic shifting or being stuck in 4th gear while the test is confirming forward clutch is failed on.</li> <li>• After a code is stored 5th and 6th are disabled.</li> <li>• Customer might notice higher than normal engine speeds and loss of fuel economy.</li> <li>• Will turn on MIL.</li> </ul>	Refer to <u>I</u>

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P0753	-	SSA Electrical Faults	SSA is open, shorted to ground or shorted to voltage.	Open, short to ground or short to power in solenoid or wiring.	<ul style="list-style-type: none"> <li>• See P0750, P0973, P0974.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0753	P0750, P0753	SSA Electrical Faults	SSA circuit is open.	Open circuit in solenoid or wiring.	<ul style="list-style-type: none"> <li>• Forward clutch is failed off - 5th and 6th only available forward gears.</li> <li>• Neutral condition or flare when fault occurs.</li> <li>• Poor launch due to 5th gear drive away.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0753	P0750, P0973	SSA Electrical Faults	SSA circuit is shorted to ground.	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action opens the transaxle solenoid power control, removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th gear as the only forward gear with TCC open).</li> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0753	P0750, P0974	SSA Electrical Faults	SSA is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>• Forward clutch is failed off - 5th and 6th gear only available forward</li> </ul>	Go to <b><u>Pin</u></b>



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					<ul style="list-style-type: none"> <li>gears.</li> <li>• Neutral condition or flare when fault occurs.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• Will turn on wrench lamp.</li> </ul>	
P0755	P0755, P0758	SSB Electrical Faults	Open circuit in solenoid or wiring.	SSB circuit is open.	<ul style="list-style-type: none"> <li>• Direct clutch failed on - only 3rd and 5th gear available.</li> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0756	P0733, P0735, P0756	Direct Clutch System Fault (includes non-electrical SSB faults, valve body and clutch)	Direct clutch failed off.	Direct clutch failed off, could be due to: <ul style="list-style-type: none"> <li>• Non-electrical failures where SSB (direct clutch VFS) is stuck off (no pressure).</li> <li>• Direct clutch regulator valve stuck in default position.</li> <li>• Direct clutch mechanical failure.</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice flares or neutral conditions on shifts into 3rd or 5th gear.</li> <li>• PCM will command 3 shifts into 3rd or 5th gear, and if direct clutch is failed off the customer will notice flares or neutral conditions that last one second or so.</li> <li>• 3rd and 5th gear are disabled, customer might notice transmission hangs in 2nd on accelerate until customer tips out to closed pedal (done to protect overdrive clutch).</li> </ul>	Refer to <b><u>I</u></b>

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					<ul style="list-style-type: none"> <li>• Will turn on MIL.</li> </ul>	
P0757	P072E, P073A, P0757	Direct Clutch System Fault (includes non-electrical SSB faults, main control valve body and clutch)	SSB failed on.	<p>SSB (direct clutch VFS) failed on, causing direct clutch failed on. Since the hydraulic controls prevent direct clutch and low/reverse clutch on together in the forward ranges we can isolate the solenoid from the clutch. This code sets if:</p> <ul style="list-style-type: none"> <li>• Non-electrical failures where SSB (direct clutch VFS) is stuck on (pressure).</li> <li>• Direct clutch regulator valve stuck in spring compress position.</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice a vehicle deceleration on a shift into 2nd, 4th or 6th gears (direct clutch failing to release will cause a tie-up in these gears).</li> <li>• Customer might notice a harsh 1-3 shift.</li> <li>• Since only 3rd and 5th gears are allowed customer might notice poor launch performance lack of shifts, harsh engagements.</li> <li>• Will turn on MIL.</li> </ul>	Refer to <u>I</u>
P0758	-	SSB Electrical Faults	SSB is open, shorted to ground or shorted to voltage.	Open, short to ground or short to power in solenoid or wiring.	<ul style="list-style-type: none"> <li>• See P0755, P0976, P0977.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <u>Pin</u>
P0758	P0755, P0758	SSB Electrical Faults	Open circuit in solenoid or wiring.	SSB circuit is open.	<ul style="list-style-type: none"> <li>• Direct clutch failed on - only 3rd and 5th gears available.</li> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 3rd gear drive away).</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <u>Pin</u>
P0758	P0758, P0976	SSB Electrical Faults	SSB circuit is shorted to ground.	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action opens the transaxle solenoid power</li> </ul>	Go to <u>Pin</u>

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					<p>control, removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th gear as the only forward gear with TCC open).</p> <ul style="list-style-type: none"> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on wrench lamp.</li> </ul>	
P0758	P0758, P0977	SSB Electrical Faults	SSB is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>• Direct clutch failed on - only 3rd and 5th gear available.</li> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 3rd gear drive away).</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0760	P0760, P0763	Shift Solenoid C (SSC) Electrical Faults	SSC circuit is open.	Open circuit in solenoid or wiring.	<p>Incorrect gear selection depending on condition mode and manual lever position. See solenoid operation chart.</p> <ul style="list-style-type: none"> <li>• Intermediate clutch is failed off - if fault occurs while in 2nd or 6th gear customer might notice a neutral condition before diagnostics disables 2nd and 6th gear.</li> <li>• Customer might</li> </ul>	Go to <b><u>Pin</u></b>

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					<p>notice erratic, delayed or harsh shifts.</p> <ul style="list-style-type: none"> <li>• Will turn on MIL.</li> </ul>	
P0761	P0761, P2702	Intermediate Clutch System Faults (includes clutch, valve body and non-electrical SSC faults)	Intermediate clutch failed off.	<p>Intermediate clutch failed off, could be due to:</p> <ul style="list-style-type: none"> <li>• Intermediate clutch VFS SSC non-electrical failed stuck off (no pressure).</li> <li>• Intermediate clutch stuck off due to mechanical failure.</li> <li>• Intermediate clutch regulator valve stuck in the default position.</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice neutral conditions or flares on shifts to 2nd or 6th gear as the test is determining intermediate clutch is failed off.</li> <li>• Once a code is stored, all gears with intermediate clutch on are disabled (2nd and 6th gear) leaving 1st gear without engine braking, 1st gear with engine braking, 3rd, 4th and 5th gears.</li> <li>• Customer might notice erratic shifting, neutral conditions, flares, higher engine speeds on highway (due to 6th gear being disabled).</li> <li>• Will turn on MIL.</li> </ul>	Refer to <u>I</u>
P0762	P0762, P2702	Intermediate Clutch System Faults (includes clutch, valve body and non-electrical SSC faults)	Intermediate clutch failed on.	<p>Intermediate clutch failed on, could be due to:</p> <ul style="list-style-type: none"> <li>• Intermediate clutch VFS SSC non-electrical failed stuck on (pressure).</li> <li>• Intermediate clutch stuck on due to mechanical failure.</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice a vehicle deceleration on a shift into 3rd or 5th gears (intermediate clutch failing to release will cause a tie-up in 3rd or 5th gears).</li> <li>• Customer might notice erratic shifting or being stuck in 6th gear while the test is</li> </ul>	Refer to <u>I</u>

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				<ul style="list-style-type: none"> <li>Intermediate clutch regulator valve stuck in the spring compressed position.</li> </ul>	<p>confirming C26 is failed on.</p> <ul style="list-style-type: none"> <li>After a code is stored 1st gear with engine braking, 1st gear without engine braking, 3rd, 4th and 5th gears are disabled.</li> <li>Customer might notice hanging in 2nd on acceleration since 2nd-6th upshifts only occur at closed pedal (due to energy limitations of overdrive clutch), harsh reverse engagements (since low/reverse clutch is not on in 2nd gear).</li> <li>Will turn on MIL.</li> </ul>	
P0763	-	SSC Electrical Faults	SSC is open, shorted to ground or shorted to voltage.	Open, short to ground or short to power in solenoid or wiring.	<ul style="list-style-type: none"> <li>See P0760, P0979, P0980.</li> <li>Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0763	P0760, P0763	SSC Electrical Faults	SSC circuit is open.	Open circuit in solenoid or wiring.	<ul style="list-style-type: none"> <li>Intermediate clutch is failed off - if fault occurs while in 2nd or 6th gears, customer might notice a neutral condition before diagnostics disables 2nd and 6th gears.</li> <li>Customer might notice erratic, delayed or harsh shifts.</li> <li>Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0763	P0760, P0797	SSC Electrical Faults	SSC circuit is shorted to	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>Failure Mode</li> </ul>	Go to <b><u>Pin</u></b>

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			ground.		<p>Effects Management action opens the transaxle solenoid power control, removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th gear as the only forward gear with TCC open).</p> <ul style="list-style-type: none"> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on wrench lamp.</li> </ul>	
P0763	P0760, P0980	SSC Electrical Faults	SSC is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>• Intermediate clutch is failed off - if fault occurs while in 2nd or 6th gear, customer might notice a neutral condition before diagnostics disables 2nd and 6th gear.</li> <li>• Customer might notice erratic, delayed or harsh shifts.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0765	P0765, P0768	SSD Electrical Faults	SSD circuit is open.	Open circuit in solenoid or wiring.	<ul style="list-style-type: none"> <li>• Overdrive clutch failed on, only 4th, 5th and 6th gears available.</li> <li>• Harsh engagements.</li> <li>• Poor launch due to</li> </ul>	Go to <b><u>Pin</u></b>

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					<p>4th gear drive away.</p> <ul style="list-style-type: none"> <li>Will turn on MIL.</li> </ul>	
P0766	P0729, P0734, P0735, P0766	Overdrive Clutch System Faults (includes non-electrical SSD faults, main control valve body and clutch)	SSD stuck off (SSD or main control valve body).	<p>SSD stuck off, both low/reverse clutch and overdrive clutch failed off. This code sets for:</p> <ul style="list-style-type: none"> <li>Low/reverse clutch/overdrive clutch VFS non-electrical fault.</li> <li>Low/reverse clutch/overdrive clutch regulator valve stuck in default position.</li> <li>Low/reverse clutch/overdrive clutch boost valve stuck in default position.</li> </ul>	<ul style="list-style-type: none"> <li>Customer may notice flares or neutral conditions on shifts into 4th, 5th or 6th gears.</li> <li>Customer might notice erratic shifting, flares, neutral conditions while the code is being set.</li> <li>1st gear with engine braking, 4th, 5th and 6th gears are disabled - customer might notice high engine speeds (since 3rd is highest available gear).</li> <li>Also might get delayed or no reverse engagement (need low/reverse clutch on to achieve reverse).</li> <li>Will turn on MIL.</li> </ul>	Refer to <b>I</b>
P0767	P072F, P073A, P073B, P0767	Overdrive Clutch System Faults (includes non-electrical SSD faults, valve body and clutch)	Overdrive clutch failed on (clutch, SSD or valve body).	<p>Overdrive clutch failed on, could be due to:</p> <ul style="list-style-type: none"> <li>Low/reverse clutch/overdrive clutch, VFS SSD non-electrical failed stuck on (pressure).</li> <li>Overdrive clutch stuck on due to mechanical failure.</li> <li>Low/reverse clutch/overdrive</li> </ul>	<ul style="list-style-type: none"> <li>Customer may notice a vehicle deceleration on a shift into 2nd or 3rd gears (overdrive clutch failing to release will cause a tie-up in 2nd or 3rd gears).</li> <li>First gear with engine braking, 1st gear without engine braking, 2nd and 3rd gears are</li> </ul>	Go to <b>Pin</b>

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				clutch regulator valve stuck in the spring compressed position.	<p>disabled.</p> <ul style="list-style-type: none"> <li>• Poor launch due to 4th gear drive away.</li> <li>• Harsh engagements.</li> <li>• Will turn on MIL.</li> </ul>	
P0768	-	SSD Electrical Faults	SSD is open, shorted to ground or shorted to voltage.	Open, short to ground or short to power in solenoid or wiring.	<ul style="list-style-type: none"> <li>• See P0765, P0982, P0983.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0768	P0765, P0768	SSD Electrical Faults	SSD circuit is open.	Open circuit in solenoid or wiring.	<ul style="list-style-type: none"> <li>• Overdrive clutch failed on, only 4th, 5th and 6th gear available.</li> <li>• Harsh engagements.</li> <li>• Poor launch due to 4th gear drive away.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0768	P0765, P0982	SSD Electrical Faults	SSD circuit is shorted to ground.	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action opens the transaxle solenoid power control, removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th gear as the only forward gear with TCC open).</li> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> </ul>	Go to <b><u>Pin</u></b>



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					<ul style="list-style-type: none"> <li>Will turn on wrench lamp.</li> </ul>	
P0768	P0765, P0983	SSD Electrical Faults	SSD is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>Overdrive clutch failed on, only 4th, 5th and 6th gears available.</li> <li>Harsh engagements, poor launch due to 4th gear drive away.</li> <li>Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0770	P0770, P0773	Shift Solenoid E (SSE) Electrical Faults	SSE circuit failure.	Open, short to ground or short to power in solenoid or wiring.	<p>SSE controls routing SSD pressure to low/reverse clutch or overdrive clutch. For SSE failed off (no pressure):</p> <ul style="list-style-type: none"> <li>Customer might notice 4th gear drive away (when 1st gear is commanded).</li> <li>After it is determined on/off is failed to no pressure then 1st gear with engine braking is disabled.</li> <li>Customer may notice nothing or may notice 2nd gear provided when 1st gear selected in low manual lever range.</li> <li>Harsh reverse engagements since low/reverse clutch does not apply in neutral or drive in this failure mode.</li> </ul> <p>For SSE failed on</p>	Go to <b><u>Pin</u></b>

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					(pressure):	
					<ul style="list-style-type: none"> <li>• High side is turned off.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• Harsh engagements.</li> <li>• No TCC apply.</li> <li>• Will turn on MIL.</li> </ul>	
P0771	P0771, P0774	SSE Non-Electrical Faults (SSE and main control valve body)	SSE stuck off.	<ul style="list-style-type: none"> <li>• The on/off solenoid (SSE) controls the multiplexing of SSD (low/reverse clutch/overdrive clutch VFS). If this solenoid fails off (no pressure), then 1st gear with engine braking is failed to 4th gear.</li> <li>• Also, if clutch select valve 2 sticks in the default position, then 1st gear with engine braking is failed to 4th gear and reverse is failed to neutral.</li> <li>• It is not necessary to distinguish SSE stuck off from valve 2 stuck default. This code means either: <ul style="list-style-type: none"> <li>○ Non-electrical SSE (on/off solenoid)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• If the on/off solenoid (SSE) is failed off or valve 2 is stuck in default position, then the customer will get 4th gear when 1st gear with engine braking is selected.</li> <li>• Customer might notice 4th gear drive way in automatic range since the control system commands 1st gear with engine braking at a stop (turns low/reverse clutch on) in case the customer moves the manual lever to reverse. Also, for valve 2 failures, the customer might get a no engagements when selecting reverse.</li> <li>• Will turn on MIL.</li> </ul>	Refer to <u>I</u>

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				<p>failed off (no pressure).</p> <ul style="list-style-type: none"> <li>○ Valve 2 stuck in default position.</li> </ul>		
P0772	P0772, P0774	SSE Non-Electrical Faults (SSE and valve body)	SSE stuck on.	<ul style="list-style-type: none"> <li>• The on/off solenoid (SSE) controls the multiplexing of SSD (low/reverse clutch/overdrive clutch VFS). If this solenoid fails on (pressure) then 1st gear without engine braking, 1st gear with engine braking and 2nd gear are the only available gears. Third gear is failed to 1st gear without engine braking, 4th gear is failed to 1st gear with engine braking, 5th gear is failed to neutral and 6th gear is a tie-up.</li> <li>• Also, if clutch select valve 2 sticks in the spring compressed position the same ratio pattern will occur. This code means either: <ul style="list-style-type: none"> <li>○ Non-electrical SSE (on/off solenoid) failed on</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• If the on/off solenoid (SSE) is failed on or valve 2 is stuck in spring compressed position, then 1st and 2nd gears are the only available gears.</li> <li>• Customer might notice flares (on shifts into 3rd gear), deceleration (on shifts into 4th gear) or neutral conditions (on shifts into 5th gear). High engine RPM (since 2nd gear is top available gear).</li> <li>• Will turn on MIL.</li> </ul>	Refer to <u>I</u>

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				(pressure). o Valve 2 stuck in spring compressed position.		
P0773	P0770, P0773	SSE Electrical Faults	SSE circuit failure.	Open, short to ground or short to power in solenoid or wiring.	<p>SSE controls routing SSD pressure to low/reverse clutch or overdrive clutch. For SSE failed off (no pressure):</p> <ul style="list-style-type: none"> <li>• Customer might notice 4th gear drive away (when 1st gear commanded).</li> <li>• After it is determined on/off is failed to no pressure then 1st gear with engine braking is disabled.</li> <li>• Customer may notice nothing or may notice 2nd gear provided when 1st gear selected in low manual lever range.</li> <li>• Harsh reverse engagements since low/reverse clutch does not apply in neutral or drive in this failure mode.</li> </ul> <p>For SSE failed on (pressure):</p> <ul style="list-style-type: none"> <li>• High side is turned off.</li> <li>• Poor launch performance (due</li> </ul>	Go to <b><u>Pin</u></b>

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					<p>to 5th gear drive away).</p> <ul style="list-style-type: none"> <li>• Harsh engagements.</li> <li>• No TCC apply.</li> <li>• Will turn on wrench lamp.</li> </ul>	
P0774	-	SSE Electrical Faults	SSE stuck on or off.	See P0771 and P0772.	<ul style="list-style-type: none"> <li>• See P0771 and P0772.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P0774	P0771, P0774	SSE Non-Electrical Faults (SSE and valve body)	SSE stuck off.	<ul style="list-style-type: none"> <li>• The on/off solenoid (SSE) controls the multiplexing of SSD (low/reverse clutch/overdrive clutch VFS). If this solenoid fails off (no pressure) then 1st gear with engine braking is failed to 4th.</li> <li>• Also, if clutch select valve 2 sticks in the default position, then 1st gear with engine braking is failed to 4th gear and reverse is failed to neutral.</li> <li>• Do not distinguish SSE stuck off from valve 2 stuck default. This code means either: <ul style="list-style-type: none"> <li>○ Non-electrical SSE (on/off solenoid) failed off (no</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• If the on/off solenoid (SSE) is failed off or valve 2 is stuck in default position, then the customer will get 4th gear when 1st gear with engine braking is selected.</li> <li>• Customer might notice 4th gear drive way in automatic range since the control system commands 1st gear with engine braking at a stop (turns low/reverse clutch on) in case the customer moves the manual lever to REVERSE. Also, for valve 2 failures the customer might get a no engagements when selecting reverse.</li> <li>• Will turn on wrench lamp.</li> </ul>	Refer to <b><u>I</u></b>

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				pressure). ○ Valve 2 stuck in default position.		
P0774	P0772, P0774	SSE Non-Electrical Faults (SSE and valve body)	SSE stuck on.	<ul style="list-style-type: none"> <li>The on/off solenoid (SSE) controls the multiplexing of SSD (low/reverse clutch/overdrive clutch VFS). If this solenoid fails on (pressure) then 1st gear without engine braking, 1st gear with engine braking and 2nd gear are the only available gears. 3rd gear is failed to 1st gear without engine braking, 4th gear is failed to 1st gear with engine braking, 5th gear is failed to neutral and 6th gear is a tie-up.</li> <li>Also, if clutch select valve 2 sticks in the spring compressed position the same ratio pattern will occur. This code means either: <ul style="list-style-type: none"> <li>Non-electrical SSE (on/off solenoid) failed on (pressure).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>If the on/off solenoid (SSE) is failed on or valve 2 is stuck in spring compressed position then 1st and 2nd are the only available gears.</li> <li>Customer might notice flares (on shifts into 3rd gear), deceleration (on shifts into 4th gear) or neutral conditions (shifts into 5th gear). High engine RPM (since 2nd gear is top available gear).</li> </ul>	Refer to <u>I</u>

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				<ul style="list-style-type: none"> <li>○ Valve 2 stuck in spring compressed position.</li> <li>● Will turn on wrench lamp.</li> </ul>		
P0960	P0960, P0748	LPC Solenoid Electrical Faults	LPC circuit is open.	Open circuit in solenoid or wiring.	<ul style="list-style-type: none"> <li>● Failed to maximum line pressure.</li> <li>● Harsh engagements.</li> <li>● Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0962	P0962, P0748	LPC Solenoid Electrical Faults	LPC circuit is shorted to ground.	Short to ground in the solenoid or wiring.	<p>Failed to minimum line pressure:</p> <ul style="list-style-type: none"> <li>● Failure Mode Effects Management action opens the transaxle solenoid power control removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th gear as the only forward gear with TCC open).</li> <li>● Harsh engagements.</li> <li>● Poor launch performance (due to 5th gear drive away).</li> <li>● No TCC apply.</li> <li>● No shifts.</li> <li>● Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0963	P0963, P0748	LPC Solenoid Electrical Faults	LPC is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>● Failed to maximum line pressure.</li> <li>● Harsh engagements.</li> <li>● Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0973	P0973, P0753	SSA Electrical Faults	SSA circuit is shorted to	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>● Failure Mode</li> </ul>	Go to <b><u>Pin</u></b>

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			ground.		<p>Effects Management action opens the transaxle solenoid power control, removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th gear as the only forward gear with TCC open).</p> <ul style="list-style-type: none"> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on MIL.</li> </ul>	
P0974	P0974, P0753	SSA Electrical Faults	SSA is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>• Forward clutch is failed off - 5th and 6th gears only available forward gears.</li> <li>• Neutral condition or flare when fault occurs.</li> <li>• Poor launch due to 5th gear drive away</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0976	P0976, P0758	SSB Electrical Faults	SSB circuit is shorted to ground.	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action opens the transaxle solenoid power control, removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th gear as the only forward gear with TCC open).</li> </ul>	Go to <b><u>Pin</u></b>



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					<ul style="list-style-type: none"> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on MIL.</li> </ul>	
P0977	P0977, P0758	SSB Electrical Faults	SSB is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>• Direct clutch failed on - only 3rd and 5th gear available.</li> <li>• Harsh engagements.</li> <li>• Poor launch due to 3rd gear drive away.</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0979	P0979, P0763	SSC Electrical Faults	SSC circuit is shorted to ground.	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action opens the transaxle solenoid power control, removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th gear as the only forward gear with TCC open).</li> <li>• Harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0980	P0980, P0763	SSC Electrical Faults	SSC is shorted to voltage.	Short to power in the wiring or solenoid.	Intermediate clutch is failed off:	Go to <b><u>Pin</u></b>

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					<ul style="list-style-type: none"> <li>• If fault occurs while in 2nd or 6th gear, customer might notice a neutral condition before diagnostics disables 2nd and 6th gears.</li> <li>• Customer might notice erratic, delayed or harsh shifts.</li> <li>• Will turn on MIL.</li> </ul>	
P0982	P0982, P0768	SSD Electrical Faults	SSD circuit is shorted to ground.	Short to ground in the solenoid or wiring.	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action opens the transaxle solenoid power control removing power from all solenoids (get PARK, REVERSE, NEUTRAL and 5th as the only forward gear with TCC open), harsh engagements.</li> <li>• Poor launch performance (due to 5th gear drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>
P0983	P0983, P0768	SSD Electrical Faults	SSD is shorted to voltage.	Short to power in the wiring or solenoid.	<ul style="list-style-type: none"> <li>• Overdrive clutch failed on, only 4th, 5th and 6th gears available.</li> <li>• Harsh engagements.</li> <li>• Poor launch due to 4th gear drive away.</li> <li>• Will turn on MIL.</li> </ul>	Go to <b><u>Pin</u></b>

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P1636	-	ADLR Faults	ADLR chip communication error.	<ul style="list-style-type: none"> <li>• Lost communication with ADLR solenoid driver.</li> <li>• ADLR is an internal PCM chip that controls the solenoids. The main micro communicates with the ADLR over a serial interface, sending out the desired solenoid state and receiving back a circuit fault status.</li> <li>• If communication is lost with the ADLR, the solenoid states become unknown, so the control system forces the transaxle solenoid power control off.</li> </ul>	<ul style="list-style-type: none"> <li>• Transaxle solenoid power control turned off, providing PARK, REVERSE, NEUTRAL and 5th gear with TCC open and maximum line pressure.</li> <li>• Harsh engagements.</li> <li>• Poor performance launch (due to 5th drive away).</li> <li>• No TCC apply.</li> <li>• No shifts.</li> <li>• Will turn on MIL.</li> </ul>	Install a n <b><u>ELECTR</u></b> <b><u>CONTRC</u></b>
P163E	-	Transmission Identification Block (solenoid strategy data programmed into the PCM)	Transmission identification version.	<ul style="list-style-type: none"> <li>• Transmission identification version incorrect (transmission identification version does not match version in PCM calibration).</li> <li>• 7-digit service banding code checksum or total transmission identification block checksum invalid.</li> <li>• Solenoid and Clutch</li> </ul>	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action of limits function to 1st gear without engine braking and 3rd could cause high engine RPM, lack of shifts complaints.</li> <li>• No TCC apply.</li> <li>• Will turn on MIL.</li> </ul>	Refer to <u>S</u>

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				<p>characterization data unavailable.</p> <ul style="list-style-type: none"> <li>• Failure Mode Effects Management will increase pressure and allow only PARK, REVERSE, NEUTRAL, 1st gear without engine braking and 3rd.</li> </ul>		
P163F	-	Transmission Identification Block (solenoid characterization data programmed into the PCM)	Transmission identification block corrupted, not programmed.	<ul style="list-style-type: none"> <li>• Transmission identification data not programmed.</li> <li>• Solenoid and Clutch strategy data unavailable.</li> <li>• Failure Mode Effects Management will increase pressure and allow only PARK, REVERSE, NEUTRAL, 1st gear without engine braking and 3rd.</li> </ul>	<ul style="list-style-type: none"> <li>• Failure Mode Effects Management action of limits function to 1st gear without engine braking and 3rd could cause high engine RPM, lack of shifts complaints.</li> <li>• No TCC apply.</li> <li>• Will turn on MIL.</li> </ul>	Refer to <u>S</u>
P1700	-	Other Main Control Valve Body Faults (stuck valves)	Multiplex manual valve (valve 3).	<p>This DTC is set if the multiplex manual valve sticks in the default position for reverse while the manual valve is in the drive or low position. Neutral will be the default condition in all forward gear ranges with SSE on. Once the PCM sees this fault, the PCM turns off SSE (SSE off) and allows the transaxle to achieve 1st, 2nd, and 3rd gears</p>	<ul style="list-style-type: none"> <li>• Customer might notice neutral conditions when 1st gear with engine braking, 1st gear without engine braking or 2nd are commanded.</li> <li>• Erratic shifting as the OBD isolate the cause of the neutral condition to multiplex manual valve (valve 3).</li> <li>• High engine speeds</li> </ul>	Refer to <u>I</u>

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				only.	<p>since 3rd is top available gear, harsh reverse engagements (since low/reverse clutch is not on in drive at low speed with this failure).</p> <ul style="list-style-type: none"> <li>Will turn on wrench lamp.</li> </ul>	
P1702	-	TR Sensor Electrical Faults	TR sensor circuit failure.	P1702 - see P0705 and P0708.	<ul style="list-style-type: none"> <li>Possible no crank, only PARK, REVERSE, NEUTRAL and 5th gear available, harsh engagements.</li> <li>Extremely delayed engagements (until a DTC is set).</li> <li>After a DTC is set and the high side opened - harsh engagements, poor performance (due to a 5th gear drive away), no shifts.</li> <li>Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P1702	P0705, P1702	TR Sensor	TR sensor circuit failure.	PCM is received an invalid combination of the 4-bit signal from the TR sensor (wiring, connector or TR sensor issue).	<ul style="list-style-type: none"> <li>Possible no crank, only PARK, REVERSE, NEUTRAL and 5th gear available, harsh engagements.</li> <li>Extremely delayed engagements (until a DTC is set).</li> <li>After a DTC is set and the high side opened - harsh engagements, poor performance (due to a 5th gear drive away), no shifts.</li> <li>Will turn on</li> </ul>	Go to <b><u>Pin</u></b>

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					wrench lamp.	
P1702	P0708, P1702	TR Sensor	TR sensor circuit failure.	PCM is received all 4 TR sensor bits open (potential sensor disconnected, wiring, connector or TR sensor issue).	<ul style="list-style-type: none"> <li>• Possible no crank, only PARK, REVERSE, NEUTRAL and 5th gear available, harsh engagements.</li> <li>• Extremely delayed engagements (until a DTC is set).</li> <li>• After a DTC is set and the high side opened - harsh engagements, poor performance (due to a 5th gear drive away), no shifts.</li> <li>• Will turn on wrench lamp.</li> </ul>	Go to <b><u>Pin</u></b>
P1705	-	TR Sensor	TR sensor.	TR sensor not indicating Park or Neutral during Key ON Engine OFF (KOEO) or Key ON Engine Running (KOER) self-test.	Carry out KOEO or KOER only.	Go to <b><u>Pin</u></b>
P1711	-	TFT	TFT sensor.	TFT out of self-test range (less than -1°C [30°F] or greater than 105°C [220°F]).	Carry out KOEO or KOER only.	Go to <b><u>Pin</u></b>
P1744	P0741, P1744	TCC System Faults (includes TCC, main control valve body and non-electrical solenoid faults)	TCC failed off.	TCC is mechanically stuck off.	<p>P0741 and P1744 mean the same thing non-electrical failure that caused the TCC to fail to apply. This code sets for:</p> <ul style="list-style-type: none"> <li>• Non-electrical TCC solenoid stuck off.</li> <li>• TCC mechanical failure.</li> <li>• TCC regulator apply valve stuck in TCC release position.</li> <li>• TCC control valve</li> </ul>	Refer to <b><u>I</u></b>

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					<p>stuck in TCC release position.</p> <ul style="list-style-type: none"> <li>• TCC functional failure MIL code.</li> <li>• TCC failed to apply (less than 80 RPM slip error lasting at least 3 seconds when TCC is commanded on) 3 consecutive times.</li> <li>• Will turn on wrench lamp.</li> </ul>	
P1780	-	Transmission Control Switch (TCS)	TCS.	TCS did not change states during KOER Self Test.	Customer cannot cancel overdrive.	Refer to <u><a href="#">TRANSA EXTERN</a></u> article.
P1783	-	Transmission Over Temperature	Transmission over temperature.	Transmission over temperature condition (greater than 135°C [275°F] for at least 5 seconds).	<ul style="list-style-type: none"> <li>• Torque converter lockup happens earlier than expected.</li> <li>• Will turn on wrench lamp.</li> </ul>	Refer to <u><a href="#">I</a></u>
P1910	-	Reverse Lamp Control	Reverse lamp control.	Reverse lamp control circuit fault.	<ul style="list-style-type: none"> <li>• Reverse lamps do not function correctly.</li> <li>• Will turn on wrench lamp.</li> </ul>	Refer to <u><a href="#">I LIGHTI</a></u>
P2700	-	Forward Clutch System Fault (includes non-electrical SSA faults, main control valve body and forward clutch)	Forward clutch failed on or off.	See P0751 and P0752.	<ul style="list-style-type: none"> <li>• See P0751 and P0752.</li> <li>• Will turn on wrench lamp.</li> </ul>	Refer to <u><a href="#">I</a></u>
P2700	P0751, P2700	Forward Clutch System Faults (includes non-electrical SSA faults, valve body and clutch)	Forward clutch failed off.	<p>Forward clutch failed off, could be due to:</p> <ul style="list-style-type: none"> <li>• Forward clutch VFS (SSA) non-electrical failed stuck off (no pressure).</li> <li>• Forward clutch</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice neutral conditions or flares on downshifts from 5th or 6th as the test is determining Forward is failed off.</li> <li>• Once a code is</li> </ul>	Refer to <u><a href="#">I</a></u>

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				<p>stuck off due to mechanical failure.</p> <ul style="list-style-type: none"> <li>• Forward clutch regulator valve stuck in the default position.</li> <li>• Forward clutch boost valve stuck in the default position.</li> </ul>	<p>stored, all gears with Forward on are disabled - leaving 5th and 6th as the only Forward gears.</p> <ul style="list-style-type: none"> <li>• Customer might notice erratic shifting, harsh engagements, neutral conditions, flares, poor launch performance (due to 5th drive away), harsh reverse engagements.</li> <li>• Will turn on wrench lamp.</li> </ul>	
P2700	P0752, P2700	Forward Clutch System Faults (includes non-electrical SSA faults, valve body and clutch)	Forward clutch failed on.	<p>Forward clutch failed on, could be due to:</p> <ul style="list-style-type: none"> <li>• Forward clutch VFS (SSA) non-electrical failed stuck on (pressure).</li> <li>• Forward clutch stuck on due to mechanical failure.</li> <li>• Forward clutch regulator valve stuck in the default position.</li> <li>• Forward clutch regulator valve stuck in the spring compressed position.</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice a vehicle deceleration on a shift into 5th or 6th gears (forward clutch failing to release will cause a tie-up in 5th or 6th gears).</li> <li>• Customer might notice erratic shifting or being stuck in 4th gear while the test is confirming forward clutch is failed on.</li> <li>• After a code is stored 5th and 6th are disabled. Customer might notice higher than normal engine speeds and loss of fuel economy.</li> <li>• Will turn on wrench lamp.</li> </ul>	Refer to <u>I</u>
P2701	-	Direct Clutch System Fault	Direct clutch failed on.	<ul style="list-style-type: none"> <li>• Direct clutch failed on due to a</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice a vehicle</li> </ul>	Refer to <u>I</u>



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		(includes non-electrical SSB faults, valve body and clutch)		<p>mechanical fault.</p> <ul style="list-style-type: none"> <li>Due to the hydraulic controls the clutch can be isolated from the solenoid - this failure code means direct clutch is on in 1st gear under conditions where the SSB (direct clutch VFS) cannot cause it to apply.</li> </ul>	<p>deceleration on a shift into 2nd, 4th or 6th gear (direct clutch failing to release will cause a tie-up in these gears).</p> <ul style="list-style-type: none"> <li>Customer might notice erratic shifting while the test is confirming direct clutch is failed on.</li> <li>After a code is stored all gears but 3rd and 5th are disabled.</li> <li>Since only 3rd and 5th gears are allowed the customer might notice: <ul style="list-style-type: none"> <li>poor launch performance.</li> <li>lack of shifts.</li> <li>harsh engagements.</li> </ul> </li> <li>Will turn on wrench lamp.</li> </ul>	
P2702	-	Intermediate Clutch System Faults (includes clutch, valve body and non-electrical SSC faults)	Intermediate clutch failed on or off.	See P0761 and P0762.	<ul style="list-style-type: none"> <li>See P0761 and P0762.</li> <li>Will turn on wrench lamp.</li> </ul>	Refer to <u>I</u>
P2702	P0761, P2702	Intermediate Clutch System Faults (includes clutch, valve body and non-electrical SSC faults)	Intermediate clutch failed off.	<p>Intermediate clutch failed off, could be due to:</p> <ul style="list-style-type: none"> <li>Intermediate clutch VFS (SSC) non-electrical failed stuck off (no pressure).</li> </ul>	<ul style="list-style-type: none"> <li>Customer may notice neutral conditions or flares on shifts to 2nd or 6th as the test is determining intermediate clutch is failed off.</li> <li>Once a code is</li> </ul>	Refer to <u>I</u>

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				<ul style="list-style-type: none"> <li>• Intermediate clutch stuck off due to mechanical failure.</li> <li>• Intermediate clutch regulator valve stuck in the default position.</li> </ul>	<p>stored, all gears with intermediate clutch on are disabled (2nd and 6th gears) leaving 1st gear without engine braking, 1st gear with engine braking, 3rd, 4th and 5th gears.</p> <ul style="list-style-type: none"> <li>• Customer might notice erratic shifting, neutral conditions, flares, higher engine speeds on highway (due to 6th gear being disabled).</li> <li>• Will turn on wrench lamp.</li> </ul>	
P2702	P0762, P2702	Intermediate Clutch System Faults (includes clutch, valve body and non-electrical SSC faults)	Intermediate clutch failed on.	<p>Intermediate clutch failed on, could be due to:</p> <ul style="list-style-type: none"> <li>• Intermediate clutch VFS (SSC) non-electrical failed stuck on (pressure).</li> <li>• Intermediate clutch stuck on due to mechanical failure.</li> <li>• Intermediate clutch regulator valve stuck in the spring compressed position.</li> </ul>	<ul style="list-style-type: none"> <li>• Customer may notice a vehicle deceleration on a shift into 3rd or 5th gears (intermediate clutch failing to release will cause a tie-up in 3rd or 5th gears).</li> <li>• Customer might notice erratic shifting or being stuck in 6th gear while the test is confirming C26 is failed on.</li> <li>• After a code is stored 1st gear with engine braking, 1st gear without engine braking, 3rd, 4th and 5th gears are disabled.</li> <li>• Customer might notice hanging in 2nd gear on</li> </ul>	Refer to <u>I</u>

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					<p>acceleration since 2nd gear - 6th gear upshifts only occur at closed pedal (due to energy limitations of overdrive clutch), harsh reverse engagements (since low/reverse clutch is not on in 2nd gear).</p> <ul style="list-style-type: none"> <li>Will turn on wrench lamp.</li> </ul>	
P2703	-	Low/Reverse Clutch and OWC Faults (covers just the clutches)	Low/reverse clutch failed off.	Low/reverse clutch provides engine braking in 1st gear and is required to achieve reverse.	<ul style="list-style-type: none"> <li>Low/reverse clutch is only tested for failed off in the low manual lever position.</li> <li>The customer might notice not getting engine braking in 1st gear with engine braking, and erratic shifting as the OBDs isolates the fault to low/reverse clutch failed off.</li> <li>Once a code is stored 2nd gear will be provided in place of 1st in the Low manual lever range.</li> <li>Customer might also experience delayed or no reverse engagement.</li> <li>Will turn on wrench lamp.</li> </ul>	Refer to <u>I</u>
P2704	-	Overdrive Clutch System Faults (includes non-electrical	Overdrive clutch failed off (clutch fault only).	<ul style="list-style-type: none"> <li>Overdrive clutch failed off.</li> <li>Since SSD</li> </ul>	<ul style="list-style-type: none"> <li>Customer may notice neutral conditions or flares on shifts into 4th,</li> </ul>	Refer to <u>I</u>

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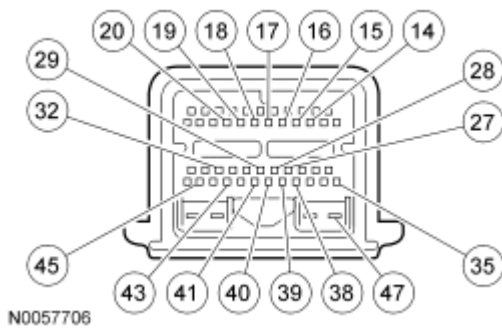
		SSD faults, valve body and clutch)		(low/reverse clutch/overdrive clutch VFS) is multiplexed we can isolate overdrive clutch failed off mechanical faults (set P2704) from SSD failed to no pressure (sets P0766).	5th, or 6th gear. <ul style="list-style-type: none"> <li>• 4th, 5th and 6th gears are disabled.</li> <li>• Customer might notice erratic shifting, neutral conditions, flares, high engine RPM (since 3rd gear is top available gear).</li> <li>• Will turn on wrench lamp.</li> </ul>	
P2705	-	OWC Faults (covers just the clutches)	OWC failed off.	<ul style="list-style-type: none"> <li>• OWC holds in 1st gear without engine braking. If the OWC fails off, 1st gear without engine braking is failed to neutral.</li> <li>• First gear with engine braking is disabled for this failure since low/reverse clutch is not intended to hold power on torque in 1st gear.</li> </ul>	<ul style="list-style-type: none"> <li>• Customer might notice neutral conditions when 1st gear without engine braking is commanded.</li> <li>• Erratic shifting as the OBD isolates the cause of the neutral condition to the OWC being failed.</li> <li>• Might also notice poor launch performance (due to 2nd gear drive away).</li> <li>• Harsh engagements.</li> <li>• Will turn on wrench lamp.</li> </ul>	Refer to <u>I</u>
P2783	-	Other Main Control Valve Body Faults (stuck valves)	TCC control valve.	<ul style="list-style-type: none"> <li>• TCC control valve stuck in the apply position. When the TCC is commanded open there will be no flow through the TCC (both apply and release circuits will be exhausted).</li> <li>• Test will run in</li> </ul>	<ul style="list-style-type: none"> <li>• Erratic shifts, vehicle disengages at a stop while in drive or low, early TCC apply.</li> <li>• Will turn on wrench lamp.</li> </ul>	Refer to <u>I</u>

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3rd or higher (when valve 2 is in the latched position, pointing SSD at overdrive clutch) when the TCC is commanded open. SSE is turned on, if the control valve is stuck this will cause the TCC to apply even though the TCC VFS is off.

### TRANSAXLE CONNECTOR LAYOUTS



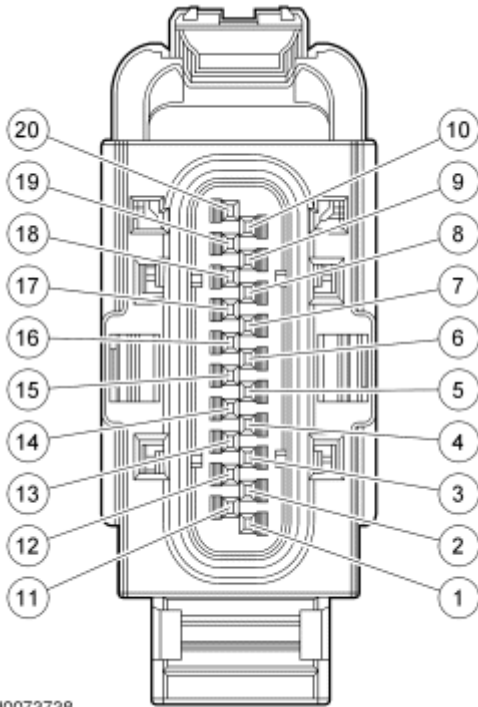
**Fig. 6: PCM Transaxle Connector - C175T**  
Courtesy of FORD MOTOR CO.

Pin Number	Circuit Function
14	Output Shaft Speed (OSS) Sensor Signal
15	Turbine Shaft Speed (TSS) Sensor Signal
16	Transmission Control Switch (TCS)
17	Transmission Range (TR)1
18	TR2
19	TR3
20	Transmission Fluid Temperature (TFT) Sensor Supply
27	Shift Solenoid B (SSB)
28	Shift Solenoid D (SSD)
29	Torque Converter Clutch (TCC) Solenoid
32	TR4
35	Line Pressure Control (LPC)

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38	Shift Solenoid E (SSE)
39	Shift Solenoid A (SSA)
40	Shift Solenoid C (SSC)
41	TSS/OSS Power
43	TFT Signal Return
45	TR/TSS/OSS Ground
47	Transaxle Solenoid Power Control Voltage



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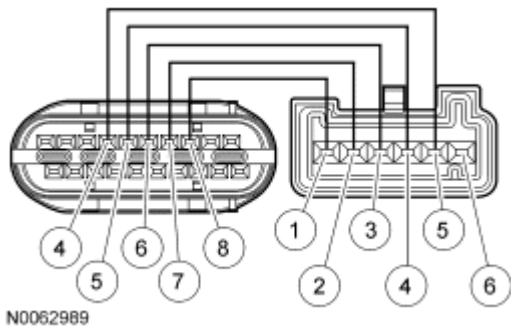
**Fig. 7: Transaxle Vehicle Harness Connector - C168**  
Courtesy of FORD MOTOR CO.

Pin Number	Circuit Function
1	Shift Solenoid E (SSE)
2	Transmission Fluid Temperature (TFT) Sensor Supply
3	TFT Signal Return
4	Transmission Range (TR)1
5	TR2
6	TR3
7	TR4
8	TR Sensor Ground
9	Turbine Shaft Speed (TSS)/Output Shaft Speed (OSS) Sensor Ground
10	OSS Sensor Signal
11	Not Used

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12	Shift Solenoid D (SSD)
13	Shift Solenoid A (SSA)
14	Torque Converter Clutch (TCC) Solenoid
15	Transaxle Solenoid Power Control Voltage
16	Shift Solenoid B (SSB)
17	Shift Solenoid C (SSC)
18	Line Pressure Control (LPC)
19	TSS Sensor Signal
20	TSS/OSS Sensor Power Supply



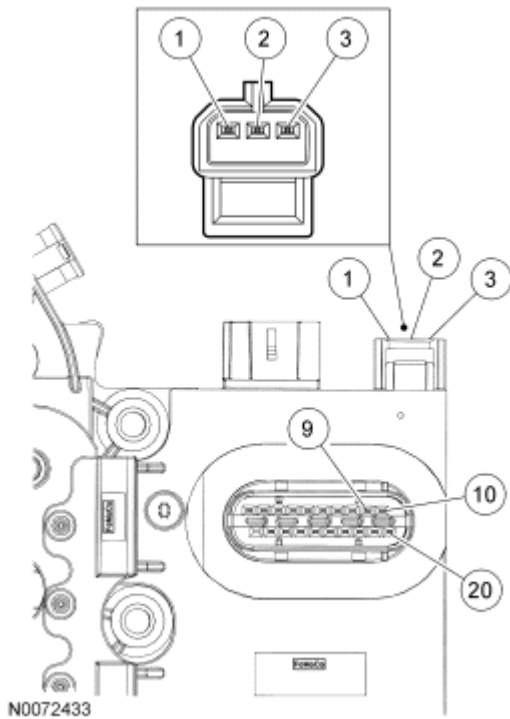
**Fig. 8: Solenoid Body-to-Transmission Range (TR) Sensor Internal Circuit Diagram**  
Courtesy of FORD MOTOR CO.

Solenoid Body Main Connector Pin Number	TR Sensor Pin Number	Circuit Function
4	5	Transmission Range (TR)1
5	4	TR2
6	3	TR3
7	2	TR4
8	1	TR Ground
-	6	Empty

**NOTE:** The Output Shaft Speed (OSS) sensor connector is on top of the 20-pin solenoid body connector (next to the Transmission Range (TR) sensor connector).

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**Fig. 9: Solenoid Body-to-Output Shaft Speed (OSS) Sensor Internal Circuit Diagram**  
Courtesy of FORD MOTOR CO.

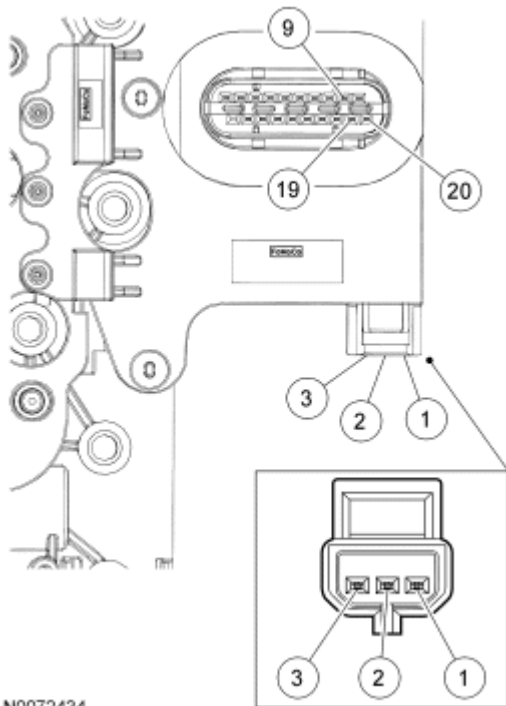
Solenoid Body Main Connector Pin Number	OSS Sensor Pin Number	Circuit Function
9	3	Turbine Shaft Speed (TSS)/Output Shaft Speed (OSS) Sensor Ground Circuit
10	1	OSS Sensor Signal
20	2	TSS/OSS Sensor Power Supply

**NOTE:** The Turbine Shaft Speed (TSS) sensor connector is below the 20-pin solenoid body connector.



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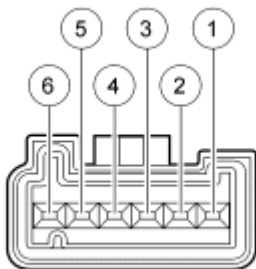
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**Fig. 10: Solenoid Body-to-Turbine Shaft Speed (TSS) Sensor Internal Circuit Diagram**  
Courtesy of FORD MOTOR CO.

Solenoid Body Main Connector Pin Number	TSS Sensor Pin Number	Circuit Function
9	1	Turbine Shaft Speed (TSS)/Output Shaft Speed (OSS) Sensor Ground Circuit
19	3	TSS Sensor Signal
20	2	TSS/OSS Sensor Power Supply



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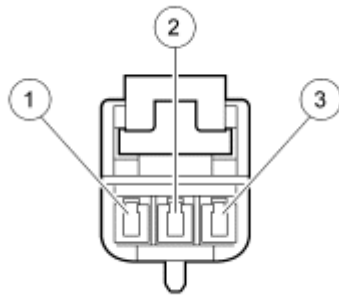
**Fig. 11: Digital Transmission Range (TR) Sensor Connector**  
Courtesy of FORD MOTOR CO.

Pin Number	Circuit Function
1	Transmission Range (TR) Ground

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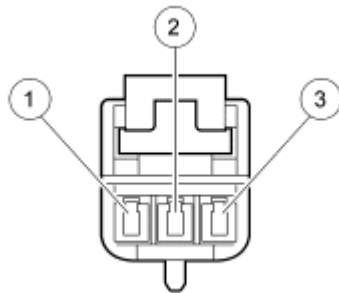
2	TR4
3	TR3
4	TR2
5	TR1
6	Empty



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**Fig. 12: Turbine Shaft Speed (TSS) Sensor/Output Shaft Speed (OSS) Sensor**  
Courtesy of FORD MOTOR CO.

Pin Number	Circuit Function
1	Turbine Shaft Speed (TSS) Sensor Ground
2	TSS Power
3	TSS Sensor Signal



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**Fig. 13: Turbine Shaft Speed (TSS) Sensor/Output Shaft Speed (OSS) Sensor**  
Courtesy of FORD MOTOR CO.

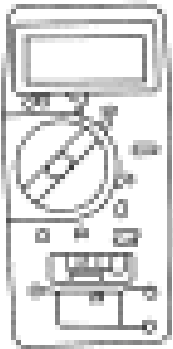
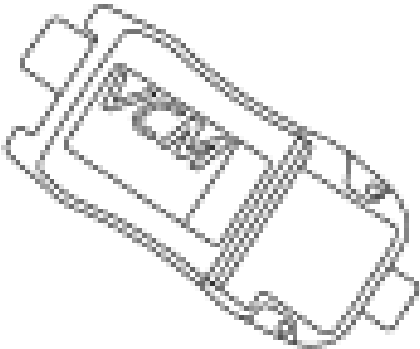
Pin Number	Circuit Function
1	Output Shaft Speed (OSS) Sensor Signal
2	OSS Power
3	OSS Sensor Ground

## PINPOINT TESTS - OSC EQUIPPED VEHICLE

### Special Tools

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Illustration	Tool Name	Tool Number
 <b>ST1137-A</b>	73III Digital Multimeter	105-R0057 or equivalent
 <b>ST2834-A</b>	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 terminal condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install new components as required.

### TRANSMISSION RANGE (TR) SENSOR DIAGNOSIS CHART

Selector Position	PID: TR	PID: TR_D			
		TR1	TR2	TR3	TR4
PARK	P/N	0	1	1	0
In Between	REV	0	0	1	0
REVERSE	REV	0	0	1	1
In Between	REV	1	0	1	1
NEUTRAL	NTRL	1	0	1	0
In Between	NTRL	1	0	0	0
Drive	Drive	1	0	0	1
In Between	Drive	0	0	0	1
Low	Low	0	0	0	0

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**A** "In Between" reading could be caused by a selector lever cable or Transmission Range (TR) sensor misaligned or a TR sensor circuit failure of TR1, TR2, TR3 or TR4.

**B** TR PIDs: 1= Open TR switch, 0 = Closed TR switch.

**C** VCM Readings: Taken from PCM signal pins for TR1, TR2, TR3 and TR4 to signal return.

### Wiggle Test Information for Open/Shorts

**A** Check TR1, TR2, TR3 and TR4 circuits for an intermittent open with the TR sensor positioned so that suspect circuit is in the closed position and monitor the TR PIDs with the scan tool.

**B** Check TR1, TR2, TR3 and TR4 circuits for an intermittent short with the TR sensor positioned so that suspect circuit is in the open position and monitor the TR PIDs with the scan tool. To determine the shorted components while observing TR PIDs, unplug the TR and see if the short goes away. If the short is still present, unplug the transaxle harness and see if the short goes away. If the short is still present, then the short is in the PCM or vehicle harness. Remove the suspect circuit(s) wire terminal from the PCM connector. If the short is still present, then the PCM has an internal failure. Otherwise, the failure is in the vehicle harness.

### Shift Solenoid Pre-Diagnosis

Use the following shift solenoid operation information when carrying out Pinpoint Test A.

### SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	Shift Solenoid					TCC (VFS) NL
		SSA (VFS) NL (CB 1,2,3,4)	SSB (VFS) NH (C 3,5,R)	SSC (VFS) NL (CB 2,6)	SSD (VFS) NH (CB L,R/4,5,6)	SSE (On/Off) NC	
P	P	Off	On	Off	Off	On	Off
R	R	Off	Off	Off	Off	On	Off
N	N	Off	On	Off	Off <sup>a</sup>	On <sup>a</sup>	Off
D	1	On	On	Off	Off <sup>b</sup>	On <sup>c</sup>	Off
	2	On	On	On	On	Off	Off
	3	On	Off	Off	On	Off	Off
	4	On	On	Off	Off	Off	On/Off
	5	Off	Off	Off	Off	Off	On/Off
	6	Off	On	On	Off	Off	On/Off
L	L	On	On	Off	Off <sup>b</sup>	On <sup>c</sup>	Off
CB = Clutch brake NC = Normally closed NH = Normally high NL = Normally low							

<sup>a</sup> Solenoid state will change if vehicle is moving forward with the selector lever in the NEUTRAL position.

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<sup>b</sup> Turns on above 10 km/h (6 mph).<sup>c</sup> Turns off above 10 km/h (6 mph).**Shift Solenoid Failure Mode Chart Failed ON or Failed OFF**

Failed ON/OFF due to PCM and/or vehicle wiring concerns and/or solenoid electrically, mechanically or hydraulically stuck ON/OFF.

**SHIFT SOLENOID A (SSA)**

Gear Commanded	Actual Gears Obtained	
	Failed ON (High Pressure)	Failed OFF (Low Pressure)
R	R	R
D	1, 2, 3, 4	5, 6

**SHIFT SOLENOID B (SSB)**

Gear Commanded	Actual Gears Obtained	
	Failed ON (Low Pressure)	Failed OFF (High Pressure)
R	N <sup>a</sup>	R
D	1, 2, 4, 6	3, 5

<sup>a</sup> Reverse is available if the solenoid circuit failed causing transaxle solenoid power control solenoid to remove voltage to all solenoids.

**SHIFT SOLENOID C (SSC)**

Gear Commanded	Actual Gears Obtained	
	Failed ON (High Pressure)	Failed OFF (Low Pressure)
R	R	R
D	2, 6	1, 3, 4, 5

**SHIFT SOLENOID D (SSD)**

Gear Commanded	Actual Gears Obtained	
	Failed ON (Low Pressure)	Failed OFF (High Pressure)
R	N <sup>a</sup>	R
D	1, 2, 3 <sup>b</sup>	4, 5, 6

<sup>a</sup> Reverse is available if the solenoid circuit failed causing transaxle solenoid power control solenoid to remove voltage to all solenoids.

<sup>b</sup> No engine braking.

**SHIFT SOLENOID E (SSE)**

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Gear Commanded	Actual Gears Obtained	
	Failed ON (High Pressure)	Failed OFF (Low Pressure)
R	R	R
D	1, 2	1 <sup>a</sup> , 2, 3, 4, 5, 6

<sup>a</sup> No engine braking.

### Pinpoint Tests

Refer to appropriate SYSTEM WIRING DIAGRAMS article, Transmission Controls - 6 Speed for schematic and connector information.

#### PINPOINT TEST A: TRANSAXLE CONTROL SOLENOIDS

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

**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, terminals are engaged in connector and in good condition before proceeding.
- Connect the diagnostic tool.
- Carry out the Key ON Engine OFF (KOEO) Self Test until continuous DTCs have been displayed.
- Enter the Output Test Mode.
- Select the mode ALL ON. Push START to turn outputs ON. Push STOP to turn outputs OFF.
- **Does vehicle enter Output Test Mode?**  
**YES :** Go to A2.  
**NO :** PRESS START. If vehicle does not enter Output Test Mode, REFER to the Introduction - Gasoline Engines article.

#### A2 CHECK THE SOLENOID CIRCUIT FOR AN OPEN

- Key in OFF position.
- Disconnect: Transaxle Vehicle Harness C168
- Use a mirror to inspect both ends of the connector for damage or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Disconnect: PCM Transaxle Electrical C175T
- Use a mirror to inspect both ends of the connector for damage or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Measure the resistance of the suspect solenoid circuit between PCM transaxle electrical C175T and transaxle harness C168 using the following chart.

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Shift Solenoid	Transaxle Vehicle Harness C168	PCM Transaxle C175T
Shift Solenoid A (SSA) CET05 (BU/GN)	C168-13	C175T-39
Shift Solenoid B (SSB) CET06 (GN/BN)	C168-16	C175T-27
Shift Solenoid C (SSC) CET07 (GY/OG)	C168-17	C175T-40
Shift Solenoid D (SSD) CET08 (BN/WH)	C168-12	C175T-28
Shift Solenoid E (SSE) CET18 (GY/YE)	C168-1	C175T-38
Line Pressure Control (LPC) CET09 (YE/VT)	C168-18	C175T-35
Torque Converter Clutch (TCC) CET10 (BU/GY)	C168-14	C175T-29

- **Is the resistance less than 5 ohms?**

**YES** : Go to A3.

**NO** : REPAIR the circuit(s) for an open. RECONNECT all components. TEST the system for normal operation.

**A3 CHECK THE SOLENOID CIRCUIT FOR A SHORT TO GROUND**

- Measure the resistance between transaxle vehicle harness C168 and ground.

Shift Solenoid	Transaxle Vehicle Harness C168	Ground
SSA CET05 (BU/GN)	C168-13	Ground
SSB CET06 (GN/BN)	C168-16	Ground
SSC CET07 (GY/OG)	C168-17	Ground
SSD CET08 (BN/WH)	C168-12	Ground
SSE CET18 (GY/YE)	C168-1	Ground
LPC CET09 (YE/VT)	C168-18	Ground
TCC CET10 (BU/GY)	C168-14	Ground

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

**YES** : Go to A4.

**NO** : REPAIR the circuit(s) for a short to ground. RECONNECT all components. TEST the system for normal operation.

**A4 CHECK THE SOLENOID CIRCUIT FOR A SHORT TO POWER**

- Measure the voltage between transaxle vehicle harness C168 and ground.

Shift Solenoid	Transaxle Vehicle Harness C168	Ground
SSA CET05 (BU/GN)	C168-13	Ground
SSB CET06 (GN/BN)	C168-16	Ground
SSC CET07 (GY/OG)	C168-17	Ground
SSD CET08 (BN/WH)	C168-12	Ground
SSE CET18 (GY/YE)	C168-1	Ground

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LPC CET09 (YE/VT)	C168-18	Ground
TCC CET10 (BU/GY)	C168-14	Ground

- **Is any voltage present?**

**YES** : REPAIR the circuit(s) for a short to power. RECONNECT all components. TEST the system for normal operation.

**NO** : Go to A5.

#### **A5 CHECK THE RESISTANCE OF THE SOLENOID FIELD CIRCUIT**

- Measure the resistance between transaxle solenoid body C168-15, component side and the suspect solenoid pin, component side and compare the value to the specifications in the table below.

Shift Solenoid	Transaxle C168 Component Side	Transaxle C168-15 Component Side
SSA CET05 (BU/GN)	C168-13	C168-15
SSB CET06 (GN/BN)	C168-16	C168-15
SSC CET07 (GY/OG)	C168-17	C168-15
SSD CET08 (BN/WH)	C168-12	C168-15
SSE CET18 (GY/YE)	C168-1	C168-15
LPC CET09 (YE/VT)	C168-18	C168-15
TCC CET10 (BU/GY)	C168-14	C168-15

#### **SOLENOID RESISTANCE VALUES: SSA, SSB, SSC, SSD, TCC AND LPC**

Temperature		Resistance (ohms)
°C	°F	
-20 to -10	-4 to 14	3.24-5.13
-10 to 0	14-32	3.43-5.32
0-10	32-50	3.62-5.51
10-20	50-68	3.81-5.70
20-30	68-86	4.00-5.89
30-40	86-104	4.19-6.08
40-50	104-122	4.38-6.27
50-60	122-140	4.57-6.46
60-70	140-158	4.76-6.65
70-80	158-176	4.95-6.83
80-90	176-194	5.13-7.02
90-100	194-212	5.32-7.21

#### **SOLENOID RESISTANCE VALUES: SSE (ON/OFF)**

Temperature		Resistance (ohms)
°C	°F	
-20 to -10	-4 to 14	15.45-24.35
-10 to 0	14-32	16.35-25.25



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0-10	32-50	17.25-26.15
10-20	50-68	18.15-27.05
20-30	68-86	19.05-27.95
30-40	86-104	19.95-28.85
40-50	104-122	20.85-29.75
50-60	122-140	21.75-30.65
60-70	140-158	22.65-31.54
70-80	158-176	23.54-32.44
80-90	176-194	24.44-33.34
90-100	194-212	25.34-34.24

- **Is the resistance within specifications?**

**YES :** INSTALL a new PCM. REFER to **ELECTRONIC ENGINE CONTROLS** article. RECONNECT all components. TEST the system for normal operation.

**NO :** REMOVE the main control cover. REFER to **Main Control Cover**. INSPECT the solenoid body for foreign material such as metal shavings on the exposed metal contacts or other components. CLEAR the solenoid body and RECHECK the resistance values. If the resistance values are still out of specification, INSTALL a new solenoid body assembly. REFER to **Solenoid Body Assembly**. RECONNECT all components. TEST the system for normal operation.

### PINPOINT TEST B: TFT SENSOR

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

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

### B1 ELECTRONIC DIAGNOSTICS

- Check to make sure transaxle vehicle harness connector C168 is fully seated, terminals are fully engaged in connector and in good condition before proceeding.

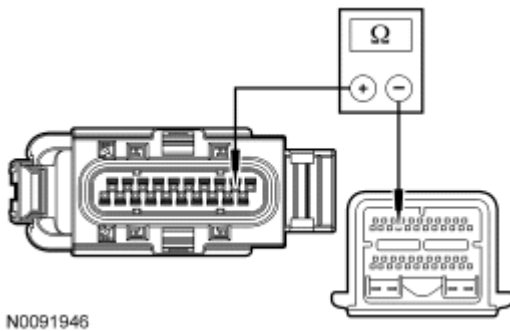
- **Have the above items been checked?**

**YES :** Go to B2.

**NO :** CARRY OUT checks. CLEAR the DTCs. REPEAT the Self Test.

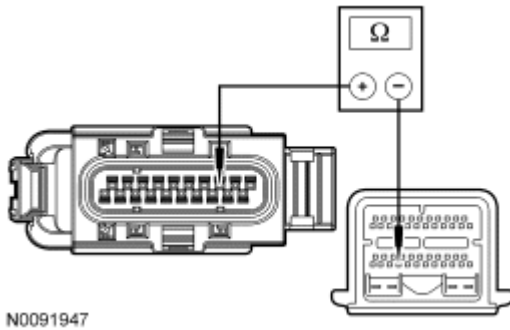
### B2 CHECK THE TFT SENSOR CIRCUITS FOR AN OPEN

- Key in OFF position.
- Disconnect: Transaxle Vehicle Harness C168
- Disconnect: PCM Transaxle C175T
- Use a mirror to inspect both ends of the connector for damage or pushed-out pins, corrosion, loose wires and missing or damaged seals.



**Fig. 14: Measuring Resistance**  
Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM transaxle C175T-20, circuit VET27 (BN/YE) and transaxle vehicle harness C168-2, circuit VET27 (BN/YE).



**Fig. 15: Measuring Resistance**  
Courtesy of FORD MOTOR CO.

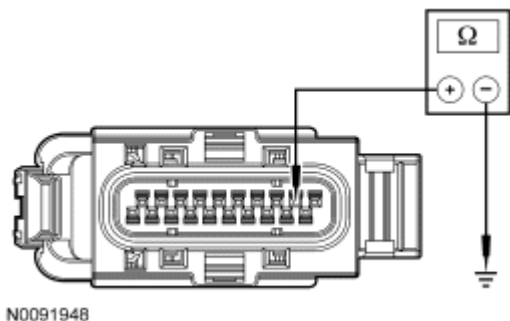
- Measure the resistance between PCM transaxle C175T-43, circuit RE406 (GY/VT) and transaxle vehicle harness C168-3, circuit RE406 (GY/VT).

- **Is the resistance less than 5 ohms?**

**YES :** Go to B3.

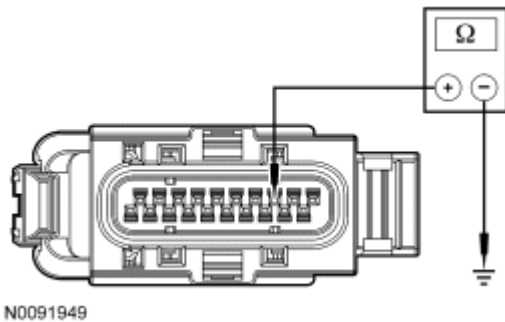
**NO :** REPAIR the circuit(s) for an open. CONNECT all components. TEST the system for normal operation.

### **B3 CHECK THE TFT SENSOR CIRCUITS FOR A SHORT TO GROUND**



**Fig. 16: Measuring Resistance**  
Courtesy of FORD MOTOR CO.

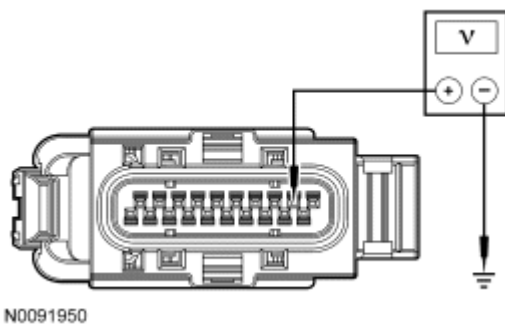
- Measure the resistance between transaxle vehicle harness C168-2, circuit VET27 (BN/YE) and ground.



**Fig. 17: Measuring Resistance**  
Courtesy of FORD MOTOR CO.

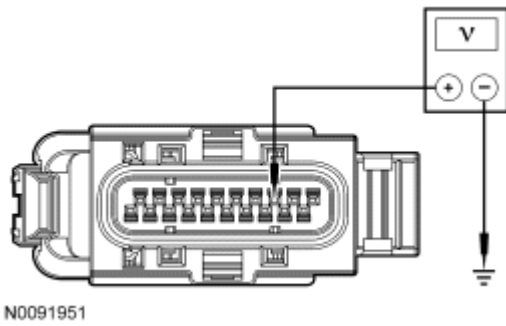
- Measure the resistance between transaxle vehicle harness C168-3, circuit RE406 (GY/VT) and ground.
- **Are the resistances greater than 10,000 ohms?**  
YES : Go to B4.  
NO : REPAIR the circuit(s) for a short to ground. CONNECT all components. TEST the system for normal operation.

**B4 CHECK THE TFT CIRCUITS FOR A SHORT TO VPWR**



**Fig. 18: Measuring Voltage**  
Courtesy of FORD MOTOR CO.

- Measure the voltage between transaxle vehicle harness C168-2, circuit VET27 (BN/YE) and ground.

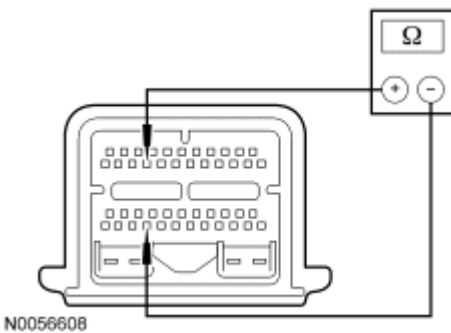


**Fig. 19: Measuring Voltage**  
Courtesy of FORD MOTOR CO.

- Measure the voltage between transaxle vehicle harness C168-3, circuit RE406 (GY/VT) and ground.
- **Is any voltage present?**  
**YES** : REPAIR the circuit(s) for a short to voltage. CONNECT all components. TEST the system for normal operation.  
**NO** : Go to B5.

#### B5 CHECK THE RESISTANCE OF THE TFT SENSORS/HARNESS

- Connect: Transaxle Vehicle Harness C168
- **TEST 1.**



**Fig. 20: Measuring Resistance Between PCM Transaxle Electrical Connector C175T Pins 20 & 43, Circuit VET27 (BN/YE) & RE406 (GY/VT)**  
Courtesy of FORD MOTOR CO.

- Measure and record the resistance between PCM transaxle C175T-20, circuit VET27 (BN/YE) and C175T-43, circuit RE406 (GY/VT).
- Compare the resistance value to the following table ranges:

#### TRANSMISSION FLUID TEMPERATURE

°C	°F	Resistance (Ohms)
-40 to -20	-40 to -4	1076K-269K
-19 to -1	-3 to 31	309K-91K

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0-20	32-68	104K-35K
21-40	69-104	40K-15K
41-70	105-158	17K-4.9K
71-90	159-194	5.6K-2.5K
91-110	195-230	3.0K-1.4K
111-130	231-266	1.7K-0.8K
131-150	267-302	0.97K-0.56K

- **TEST 2.**

- Check for intermittent short or open.
- If the resistance was between 0.8k and 100k ohms, carry out the following test. If the transaxle is warm, allow it to cool. Check the TFT sensor resistance again. Compare the resistance with the initial resistance. The resistance should decrease if the transaxle was heated and should increase if the transaxle was allowed to cool. If correct, then change in the resistance occurs, repeat OBD.

- **Is the resistance in the range?**

**YES :** INSTALL a new PCM. CONNECT all components. TEST the system for normal operation.

**NO :** INSTALL a new solenoid body. REFER to Solenoid Body Assembly. RECONNECT all components. TEST the system for normal operation.

### PINPOINT TEST C: TSS AND OSS SENSORS

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

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

### C1 ELECTRONIC DIAGNOSTICS

- Check to make sure transaxle vehicle harness C168 is fully seated, terminals are engaged in connector and in good condition before proceeding.

- **Have the items above been checked?**

**YES :** Go to C2.

**NO :** CARRY OUT the checks. CLEAR the DTCs. RERUN the OBD Tests.

### C2 ELECTRONIC DIAGNOSTICS

- Connect the diagnostic tool.
- Monitor the speed sensor PIDs while test driving the vehicle.
- **Are the Turbine Shaft Speed (TSS) and Output Shaft Speed (OSS) sensor signals present and consistent?**

**YES :** The condition that set the DTC is intermittent and is not currently present. ERASE the codes. RERUN the OBD Tests.

**NO :** Go to C3.

### C3 CHECK THE TRANSAXLE VEHICLE HARNESS FOR AN OPEN CIRCUIT

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- Disconnect: Transaxle Vehicle Harness C168
- Disconnect: PCM Transaxle C175T
- Use a mirror to inspect both ends of the connectors for damage or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Measure the resistance for the speed sensor circuits between the transaxle vehicle harness C168 and the PCM transaxle C175T.

Speed Sensor Circuit	Transaxle Vehicle Harness C168	PCM Transaxle C175T
TSS/OSS power supply LE111 (VT/GN)	C168-20	C175T-41
TSS/OSS ground RET24 (BN/BU)	C168-9	C175T-45
TSS sensor signal VET33 (WH/OG)	C168-19	C175T-15
OSS sensor signal VET26 (BN/GN)	C168-10	C175T-14

- **Is the resistance less than 5 ohms?**

**YES :** Go to C4.

**NO :** REPAIR the circuit(s) for an open. CONNECT all components. TEST the system for normal operation.

### C4 CHECK THE TRANSAXLE VEHICLE HARNESS FOR A SHORT TO GROUND

- Measure the resistance for the speed sensor circuits between transaxle vehicle harness C168 and ground.

Speed Sensor Circuit	Transaxle Vehicle Harness C168	Ground
TSS/OSS power supply LE111 (VT/GN)	C168-20	Ground
TSS/OSS ground RET24 (BN/BU)	C168-9	Ground
TSS sensor signal VET33 (WH/OG)	C168-19	Ground
OSS sensor signal VET26 (BN/GN)	C168-10	Ground

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

**YES :** Go to C5.

**NO :** REPAIR the circuit(s) for a short to ground. CONNECT all components. TEST the system for normal operation.

### C5 CHECK THE TRANSAXLE VEHICLE HARNESS FOR A SHORT TO VPWR

- Check for voltage from the speed sensor circuits at transaxle vehicle harness C168.

Speed Sensor Circuit	Transaxle Vehicle Harness C168	Ground
TSS/OSS power supply LE111 (VT/GN)	C168-20	Ground
TSS/OSS ground RET24 (BN/BU)	C168-9	Ground
TSS sensor signal VET33 (WH/OG)	C168-19	Ground
OSS sensor signal VET26 (BN/GN)	C168-10	Ground

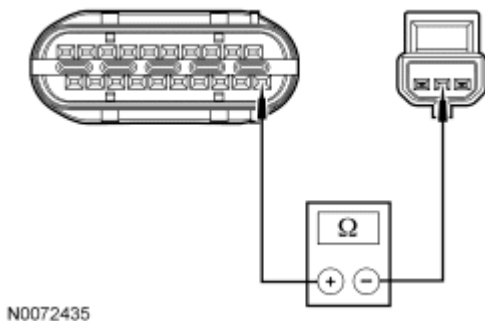
- **Is any voltage present?**

**YES** : REPAIR the circuit(s) for a short to voltage. CONNECT all components. TEST the system for normal operation.

**NO** : Go to C6.

#### **C6 CHECK THE SOLENOID BODY FOR AN INTERNAL OPEN CIRCUIT**

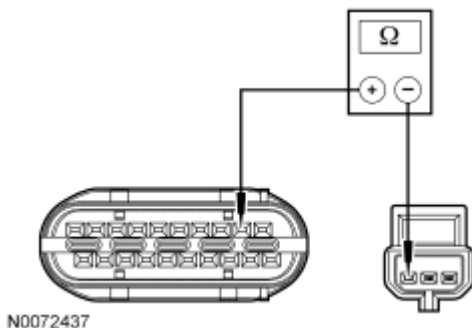
- Remove the main control cover. Refer to Main Control Cover.
- Disconnect: TSS Sensor
- Disconnect: OSS Sensor
- Use a mirror to inspect both ends of the connectors for damage or pushed-out pins, corrosion, loose wires and missing or damaged seals.



**Fig. 21: Measuring Resistance Of Solenoid Body Internal Speed Sensor Power Circuit Between Main Solenoid Body Connector Pin 20 & OSS Sensor Connectors Pin 2**  
Courtesy of FORD MOTOR CO.

**NOTE:** The OSS sensor is above the main solenoid body connector next to the Transmission Range (TR) sensor, the TSS sensor connector is below the main solenoid body connector.

- Measure the resistance of the solenoid body internal speed sensor power circuit between the main solenoid body connector pin 20, solenoid body side and the TSS or OSS sensor connectors pin 2, solenoid body side.

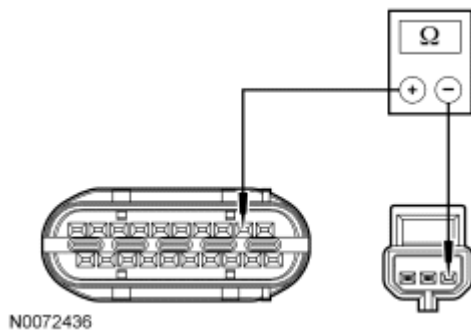


**Fig. 22: Measuring Resistance Of Solenoid Body Internal Speed Sensor Power Circuit Between Main Solenoid Body Connector Pin 9 & OSS Sensor Connectors Pin 3**

Courtesy of FORD MOTOR CO.

**NOTE:** The OSS sensor is above the main solenoid body connector next to the TR sensor.

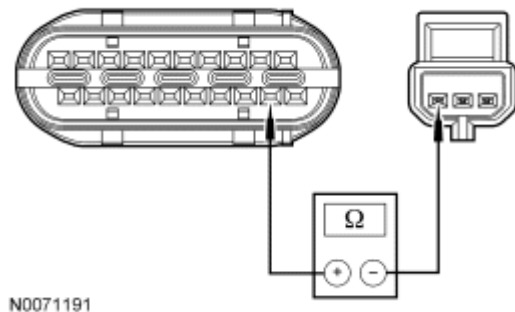
- Measure the resistance of the solenoid body internal speed sensor ground circuit between the main solenoid body connector pin 9, solenoid body side and OSS sensor connector pin 3, solenoid body side.



**Fig. 23: Measuring Resistance Of Solenoid Body Internal Speed Sensor Power Circuit Between Main Solenoid Body Connector Pin 9 & TSS Sensor Connectors Pin 1**  
Courtesy of FORD MOTOR CO.

**NOTE:** The TSS sensor connector is below the main solenoid body connector.

- Measure the resistance of the solenoid body internal speed sensor ground circuit between the main solenoid body connector pin 19, solenoid body side and TSS sensor connector pin 1, solenoid body side.

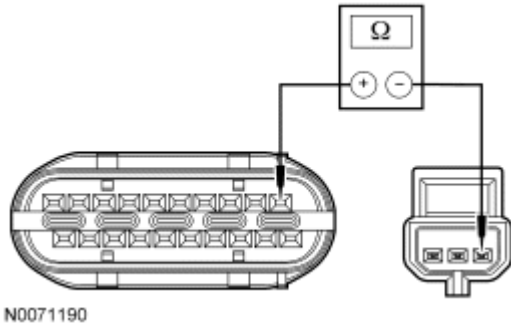


**Fig. 24: Measuring Resistance Of Solenoid Body Internal Speed Sensor Power Circuit Between Main Solenoid Body Connector Pin 19 & TSS Sensor Connectors Pin 1**  
Courtesy of FORD MOTOR CO.

**NOTE:** The TSS sensor connector is below the main solenoid body connector.



- Measure the resistance of the solenoid body internal circuit for the TSS sensor signal between the main solenoid body connector pin 19, solenoid body side and TSS sensor connector pin 3, solenoid body side.



**Fig. 25: Measuring Resistance Of Solenoid Body Internal Speed Sensor Power Circuit Between Main Solenoid Body Connector Pin 10 & OSS Sensor Connectors Pin 1**  
Courtesy of FORD MOTOR CO.

**NOTE:** The OSS sensor is above the main solenoid body connector next to the TR sensor.

- Measure the resistance of the solenoid body internal circuit for the OSS sensor signal between the main solenoid body connector pin 10, solenoid body side and OSS sensor connector pin 1, solenoid body side.

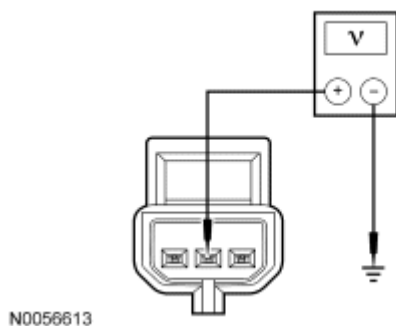
- **Is the resistance less than 5 ohms?**

**YES :** Go to C7.

**NO :** INSTALL a new solenoid body. REFER to Solenoid Body Assembly. CONNECT all components. TEST the system for normal operation.

#### **C7 CHECK FOR VOLTAGE AT THE SPEED SENSOR CONNECTORS**

- Connect: PCM Transaxle C175T
- Connect: Transaxle Vehicle Harness Connector C168
- Key in ON position.



**Fig. 26: Measuring Voltage At TSS Sensor Connector Pin 2, Solenoid Body Side Or OSS Sensor Connector Pin 2**

Courtesy of FORD MOTOR CO.

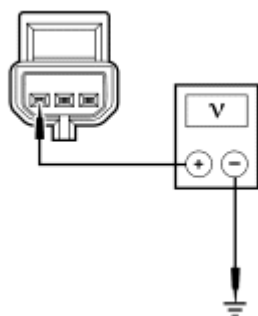
- Measure the voltage at TSS sensor connector pin 2, solenoid body side or OSS sensor connector pin 2, solenoid body side.

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

**YES :** Go to C8.

**NO :** INSTALL a new PCM. REFER to **ELECTRONIC ENGINE CONTROLS** article.  
CONNECT all components. TEST the system for normal operation.

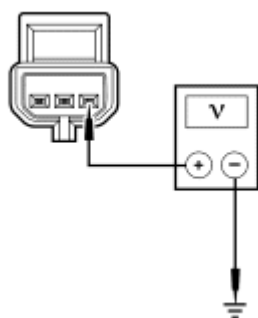
#### **C8 CHECK FOR REFERENCE SIGNAL VOLTAGE AT THE SPEED SENSOR CONNECTORS**



**Fig. 27: Measuring Voltage At TSS Sensor Connector Pin 3, Solenoid Body Side**  
Courtesy of FORD MOTOR CO.

**NOTE:** The TSS sensor connector is below the main solenoid body connector.

- Measure the voltage at TSS sensor connector pin 3, solenoid body side.



**Fig. 28: Measuring Voltage At OSS Sensor Connector Pin 1, Solenoid Body Side**  
Courtesy of FORD MOTOR CO.

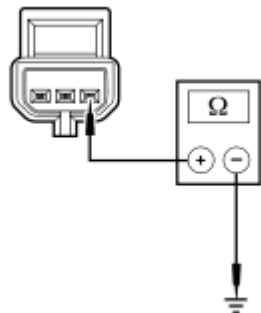
**NOTE:** The OSS sensor is above the main solenoid body connector next to the TR sensor.

- Measure the voltage at OSS sensor connector pin 1, solenoid body side.
- **Is the voltage between 4.5 and 5.5 volts?**

**YES :** Go to C9.

**NO :** INSTALL a new PCM. REFER to **ELECTRONIC ENGINE CONTROLS** article.  
CONNECT all components. TEST the system for normal operation.

**C9 CHECK FOR GROUND AT THE SPEED SENSOR CONNECTORS**



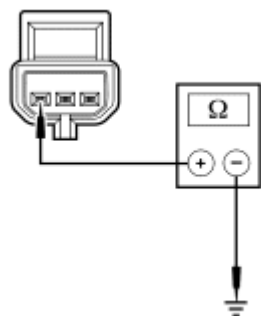
N0072441

**Fig. 29: Measuring Resistance Between TSS Sensor Connector Pin 1, Solenoid Body Side & Ground**

Courtesy of FORD MOTOR CO.

**NOTE:** The TSS sensor connector is below the main solenoid body connector.

- Measure the resistance between TSS sensor connector pin 1, solenoid body side and ground.



N0072440

**Fig. 30: Measuring Resistance Between OSS Sensor Connector Pin 3, Solenoid Body Side & Ground**

Courtesy of FORD MOTOR CO.

**NOTE:** The OSS sensor is above the main solenoid body connector next to the TR sensor.

- Measure the resistance between OSS sensor connector pin 3, solenoid body side and ground.
- **Is the resistance less than 5 ohms?**

**YES :** INSTALL a new speed sensor. REFER to **Turbine Shaft Speed (TSS) Sensor** or **Output Shaft Speed (OSS) Sensor**. TEST the system for normal operation. If the condition is still present, INSTALL a new PCM. REFER to **ELECTRONIC ENGINE CONTROLS** article.

**NO** : INSTALL a new PCM. REFER to **ELECTRONIC ENGINE CONTROLS** article.  
CONNECT all components. TEST the system for normal operation.

**PINPOINT TEST D: TR SENSOR**

**NOTE:** Refer to the Transmission Range (TR) Sensor Connector illustration **Transaxle Connector Layouts**.

**NOTE:** Refer to the Transmission Range (TR) Sensor Diagnosis Chart preceding these pinpoint tests.

**D1 VERIFY DTCs**

- Key in OFF position.
- Select PARK.
- Carry out the On-Board Diagnostic (OBD) Test. DTCs P0705 and P0708 cannot be set by an incorrectly adjusted selector lever cable.
- **Are only DTCs P0705, P0708 present?**  
**YES** : Go to D3.  
**NO** : Go to D2.

**D2 VERIFY SELECTOR LEVER CABLE/LINKAGE ADJUSTMENT**

- Disconnect the selector lever cable end from the manual control lever.
- Place the transaxle manual control lever in the DRIVE position.
- Select DRIVE.
- Reconnect the selector lever cable/linkage.
- Verify that the selector lever cable/linkage is correctly adjusted. Refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article.
- **Is the selector lever cable/linkage correctly adjusted?**  
**YES** : Go to D3.  
**NO** : ADJUST the selector lever cable/linkage. REFER to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article. Go to D4.

**D3 CHECK THE ELECTRICAL SIGNAL OPERATION**

- Select PARK.
- Disconnect: PCM Transaxle C175T
- Disconnect: Transaxle Vehicle Harness C168
- Use a mirror to inspect both ends of the connectors for damaged or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- **Is there damage to the connectors, pins or harness?**  
**YES** : REPAIR as required. CLEAR DTCs and RERUN On-Board Diagnostic (OBD) Tests.  
**NO** : Go to D4.

**D4 CHECK ELECTRICAL SYSTEM OPERATION TR AND PCM**

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- Key in OFF position.
- Connect the diagnostic tool.
- Connect: PCM Transaxle C175T
- Connect: Transaxle Vehicle Harness C168
- Key in ON position.
- Enter the following diagnostic mode on the diagnostic tool: TR PIDs: TR, TR1, TR2, TR3, and TR4
- Move the TR selector lever into each gear and stop.
- Observe any of the following PIDs (vehicle-dependent), TR, TR1, TR2, TR3, and TR4 while wiggling harness, tapping on sensor or driving the vehicle.
- Compare the PIDs to the Transmission Range (TR) Sensor Diagnosis Chart.
- **Do the PIDs TR, TR1, TR2, TR3, TR4 match the Transmission Range (TR) Sensor Diagnosis Chart, and do they remain steady when the harness is wiggled, the sensor is tapped on or the vehicle driven?**

**YES :** The problem is not in the digital TR sensor system. REFER to **Diagnosis By Symptom** for further diagnosis.

**NO :** If the PIDs change when wiggling the harness, tapping on the sensor or driving the vehicle, the problem may be intermittent. Go to D5.

### D5 CHECK THE TRANSAXLE VEHICLE TRANSAXLE HARNESS FOR AN OPEN

- Disconnect: PCM Transaxle C175T
- Disconnect: Transaxle Vehicle Harness C168
- Measure the resistance for the TR sensor circuits between the transaxle vehicle harness C168 and the PCM transaxle C175T.

TR Sensor Circuit	Transaxle Vehicle Harness C168	PCM Transaxle C175T
TR-1 VET29 (VT/WH)	C168-4	C175T-17
TR-2 VET30 (YE)	C168-5	C175T-18
TR-3 VET31 (BU/OG)	C168-6	C175T-19
TR-4 VET32 (VT)	C168-7	C175T-32
TR Ground RET24 (BN/BU)	C168-8	C175T-45

- **Is the resistance less than 5 ohms?**

**YES :** Go to D6.

**NO :** REPAIR the circuit. CONNECT all components. TEST the system for normal operation.

### D6 CHECK THE TRANSAXLE VEHICLE HARNESS FOR A SHORT TO GROUND

- Measure the resistance for the TR sensor circuits between the transaxle vehicle harness C168 and ground.

TR Sensor Circuit	Transaxle Vehicle Harness C168	Ground

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TR-1 VET29 (VT/WH)	C168-4	Ground
TR-2 VET30 (YE)	C168-5	Ground
TR-3 VET31 (BU/OG)	C168-6	Ground
TR-4 VET32 (VT)	C168-7	Ground
TR Ground RET24 (BN/BU)	C168-8	Ground

- **Are all resistances greater than 10,000 ohms?**

**YES** : Go to D7.

**NO** : REPAIR shorted circuit(s). RECONNECT all components. TEST the system for normal operation.

### D7 CHECK THE TRANSAXLE VEHICLE HARNESS FOR A SHORT TO POWER

- Measure the voltage for the TR sensor circuits between the transaxle vehicle harness C168 and ground.

TR Sensor Circuit	Transaxle Vehicle Harness C168	Ground
TR-1 VET29 (VT/WH)	C168-4	Ground
TR-2 VET30 (YE)	C168-5	Ground
TR-3 VET31 (BU/OG)	C168-6	Ground
TR-4 VET32 (VT)	C168-7	Ground
TR Ground RET24 (BN/BU)	C168-8	Ground

- **Is any voltage present?**

**YES** : REPAIR shorted circuit(s). RECONNECT all components. TEST the system for normal operation.

**NO** : Go to D8.

### D8 CHECK FOR A SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS

- Measure the resistance between TR sensor and PCM Transaxle C175T.

TR Sensor Circuit	PCM Transaxle C175T	Ground
TR-1 VET29 (VT/WH)	C175T-17	Ground
TR-2 VET30 (YE)	C175T-18	Ground
TR-3 VET31 (BU/OG)	C175T-19	Ground
TR-4 VET32 (VT)	C175T-32	Ground
TR Ground RET24 (BN/BU)	C175T-45	Ground

- **Are all resistances greater than 10,000 ohms?**

**YES** : Go to D9.

**NO** : REPAIR shorts on circuits having less than 10,000 ohms between other TR/PCM input signal circuits. RECONNECT all components. TEST the system for normal operation.

### D9 CHECK FOR AN INTERNAL SOLENOID BODY OPEN FOR THE TR SENSOR CIRCUITS

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- Remove the main control cover. Refer to **Main Control Cover**.
- Disconnect: TR Sensor Connector
- Use a mirror to inspect both ends of the connector for damage or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Measure the resistance of the TR sensor circuits between the transaxle vehicle harness connector, component side and the TR sensor connector, solenoid body side.

TR Sensor Circuit	Transaxle Vehicle Harness Connector Pin (Component Side)	TR Sensor Connector Pin (Solenoid Body Side)
TR-1	4	5
TR-2	5	4
TR-3	6	3
TR-4	7	2
TR Ground	8	1

- **Is the resistance less than 5 ohms?**

**YES :** INSTALL a new TR sensor. REFER to **Digital Transmission Range (TR) Sensor**. RECONNECT all components. TEST the system for normal operation.

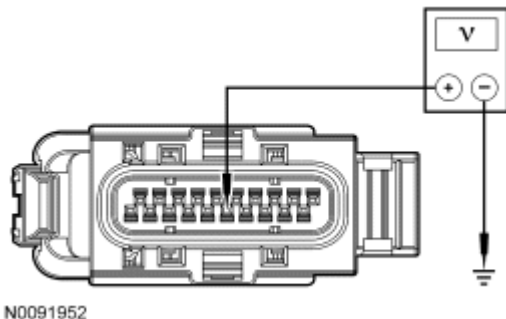
**NO :** INSTALL a new solenoid body. REFER to **Solenoid Body Assembly**. RECONNECT all components. TEST the system for normal operation.

### PINPOINT TEST E: TRANSAXLE SOLENOID POWER CONTROL CIRCUIT

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

#### E1 CHECK FOR VOLTAGE AT THE TRANSAXLE VEHICLE HARNESS C168

- Disconnect: Transaxle Vehicle Harness C168
- Use a mirror to inspect both ends of the connector for damage or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- Key in ON position.



**Fig. 31: Measuring Voltage**  
Courtesy of FORD MOTOR CO.

- Measure the voltage at the transaxle vehicle harness C168-15, circuit CET49 (BN).

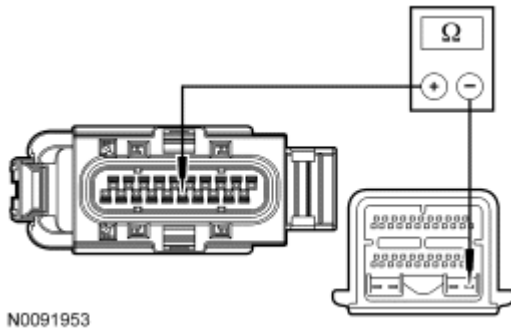
- **Is the voltage greater than 10 volts?**

**YES :** INSTALL a new solenoid body. REFER to **Solenoid Body Assembly**. RECONNECT all components. TEST the system for normal operation.

**NO :** Go to E2.

## E2 CHECK THE TRANSAXLE SOLENOID POWER CONTROL CIRCUIT FOR AN OPEN

- Key in OFF position.
- Disconnect: PCM Transaxle C175T



**Fig. 32: Measuring Resistance**  
Courtesy of FORD MOTOR CO.

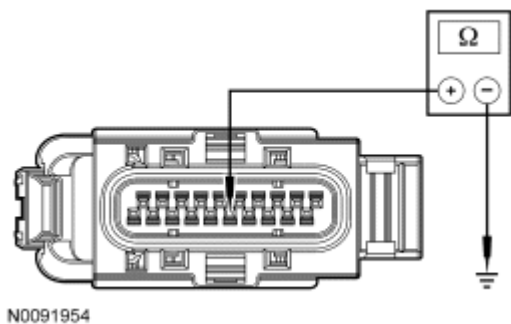
- Measure the resistance between the PCM transaxle C175T-47, circuit CET49 (BN) and transaxle vehicle harness C168-15, circuit CET49 (BN).

- **Is the resistance less than 5 ohms?**

**YES :** Go to E3.

**NO :** REPAIR circuit CET49 (BN) for an open. RECONNECT all components. TEST the system for normal operation.

## E3 CHECK THE TRANSAXLE SOLENOID POWER CONTROL CIRCUIT FOR A SHORT TO GROUND



**Fig. 33: Measuring Resistance**



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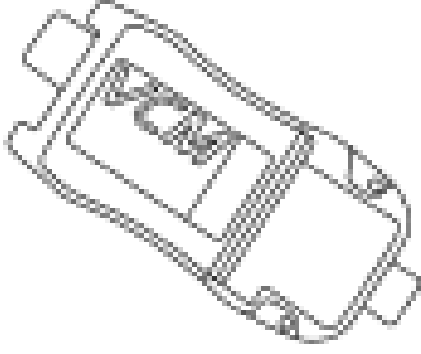
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### Courtesy of FORD MOTOR CO.

- Measure the resistance between the transaxle vehicle harness C168-15, circuit CET49 (BN) and ground.
- **Is the resistance greater than 10,000 ohms?**  
**YES** : INSTALL a new PCM. REFER to **ELECTRONIC ENGINE CONTROLS** article. RECONNECT all components. TEST the system for normal operation.  
**NO** : REPAIR circuit CET49 (BN) for a short to ground. RECONNECT all components. TEST the system for normal operation.

### SPECIAL TESTING PROCEDURES

#### Special Tools

Illustration	Tool Name	Tool Number
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) 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.

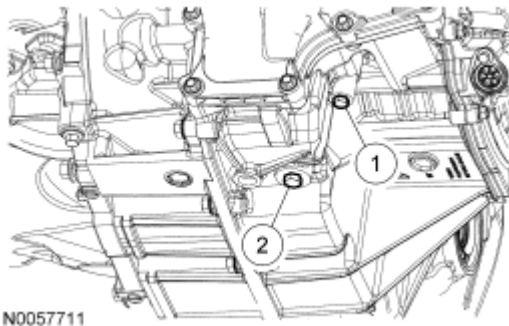
#### Engine Idle Speed Check

Refer to the **Introduction - Gasoline Engines** article for diagnosis and testing of the engine idle speed.

#### Line Pressure Test

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**Fig. 34: Identifying Line Pressure Tap & Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Line pressure tap
2	-	Transmission fluid drain plug

**NOTE:** Carry out the Line Pressure Test prior to carrying out the Stall Speed Test. If the line pressure is low at stall, do not carry out the Stall Speed Test or further transaxle damage will occur. Do not maintain Wide Open Throttle (WOT) in any transaxle range for more than 5 seconds.

**NOTE:** Do not mistake the transmission fluid drain plug for the line pressure tap plug or the transmission fluid will have to be refilled.

This test verifies that the line pressure is within specification.

1. Connect a pressure gauge to the line pressure tap.
2. Start the engine and check the line pressures see the line pressure chart to determine if the line pressure is within specification.

### LINE PRESSURE CHART

Gear	Line
<b>Pressures at Idle<sup>a</sup></b>	
P	379-448 kPa (55-65 psi)
R	655-724 kPa (95-105 psi)
N	379-448 kPa (55-65 psi)
D	552-621 kPa (80-90 psi)
L	552-621 kPa (80-90 psi)
<b>Pressure at Wide Open Throttle (WOT) Stall<sup>a</sup></b>	
P	379-448 kPa (55-65 psi)
R	2,034-2,206 kPa (295-320 psi)
N	379-448 kPa (55-65 psi)

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D	1,689-1,758 kPa (245-255 psi)
L	1,689-1,758 kPa (245-255 psi)

<sup>a</sup> All pressures are approximate.

- If the line pressure is not within specification, go to **Pinpoint Test A** to diagnose the Line Pressure Control (LPC) operation. If LPC operation is OK, see the Line Pressure Diagnosis Chart for line pressure concern causes.
- When the pressure tests are completed, install the pressure tap plug.
  - Tighten to 9 Nm (80 lb-in).

### LINE PRESSURE DIAGNOSIS CHART

Test Results	Possible Source
HIGH at IDLE - ALL RANGES	Wiring Harnesses Line Pressure Control (LPC) Solenoid Main Regulator Valve
LOW at IDLE - ALL RANGES	Low Fluid Level Fluid Inlet Filter/Seal Main Control Body Cross Leaks Gaskets Pump Separator Plate
LOW in Park ONLY	Valve Body
LOW in Reverse ONLY	Separator Plate Reverse Clutch Valve Body Forward Clutch
LOW in Neutral ONLY	Valve Body
LOW in Overdrive ONLY	Forward Clutch Valve Body
LOW in Drive ONLY	Forward Clutch
LOW in Manual 1st ONLY	Forward Clutch 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.

**NOTE:** Carry out Line Pressure Test prior to carrying out Stall Speed Test. If the line

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**pressure is low at stall, do not carry out Stall Speed Test or further transaxle damage will occur.**

The Stall Speed Test checks:

- Torque Converter Clutch (TCC) operation and installation.
- holding ability of the forward clutch.
- reverse clutch (the low-reverse bands).
- planetary One-Way Clutch (OWC).
- 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.

### STALL SPEED CHART

Engine	Stall Speed
3.5L	2,350-2,650

1. Connect the scan tool.

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

2. In each of the following ranges D, L and R, press the accelerator pedal to the floor and hold it just long enough to let the engine get to WOT. While making this test, do not hold the throttle open for more than 5 seconds at a time.
3. Note the results in each range.
4. 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.
5. Use the Stall Speed Diagnosis Chart for corrective actions.

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

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

### STALL SPEED DIAGNOSIS CHART

Range	Possible Source
D, L	Forward Clutch Low/Reverse Clutch Low/One-Way Clutch (OWC)

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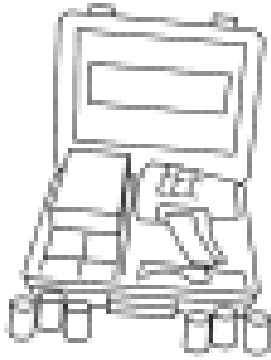
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R

Low/Reverse Clutch  
Direct Clutch

### LEAKAGE INSPECTION

#### Special Tools

Illustration	Tool Name	Tool Number
 ST1300-A	100W/12 Volt DC UV Lamp	164-R0751 or equivalent

#### Material

Item	Specification
Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye 164-R3701 (Rotunda)	-
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

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

Leakage at the transaxle pan-to-case gasket often can be stopped by tightening the attaching bolts to 9 Nm (80 lb-in). If necessary, install a new pan case gasket.

Check the transmission fluid filler tube connection at the transmission case. If leakage is found here, install a new grommet.

Check transmission fluid lines and fittings between the transmission and the cooler in the radiator tank for wear or damage. If leakage cannot be stopped by tightening a transmission fluid tube nut, install new parts. When transmission fluid is found leaking between the case and the cooler line fitting, check for missing or damaged O-ring, then tighten the fitting to maximum specification.

If the leak continues, install a new cooler tube fitting and tighten to specification. The same procedure should be

followed for transmission fluid leaks between the radiator cooler and the cooler tube fittings. Refer to **TRANSAXLE/TRANSMISSION COOLING** article.

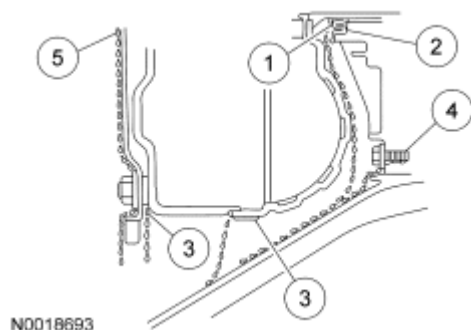
Check the engine coolant in the radiator. If the transmission fluid is present in the coolant, the cooler in the radiator is probably leaking. The cooler can be further checked for leaks by disconnecting the tubes for the cooler fittings and applying no more than 345 kPa (50 psi) air pressure to the fittings. Remove the coolant recovery cap to relieve the pressure buildup at the exterior of the transmission fluid cooler tank. If the cooler is leaking and/or will not hold pressure, install a new cooler.

If leakage is found at the transaxle range selector lever, install a new seal.

If leakage is found at the transaxle internal harness connector, install a new O-ring.

### Fluid Leakage in Torque Converter Area

In diagnosing and correcting fluid leaks in the torque converter area, use the following procedures to locate the exact cause of the leakage. Leakage at the front of the transaxle, as evidenced by fluid around the torque converter housing, may have several sources. By careful observation it is possible, in many instances, to pinpoint the source of the leak before removing the transaxle from the vehicle. The paths which the fluid takes to reach the bottom of the torque converter housing are shown in the illustration. The 5 steps following correspond with the numbers in the illustration.



**Fig. 35: Identifying Torque Converter Fluid Leakage Area**  
Courtesy of FORD MOTOR CO.

1. Transmission fluid leaking by the converter hub seal lip will tend to move along the drive hub and onto the back of the torque converter. Except in the case of a total seal failure, transmission fluid leakage by the lip of the seal will be deposited on the inside of the torque converter housing only, near the outside diameter of the housing.
2. Transmission fluid leakage by the outside diameter of the converter impeller hub seal and the case will follow the same path that leaks by the inside diameter of the converter hub seal follow.
3. Transmission fluid leakage from the converter cover weld or the converter-to-flexplate stud weld will appear at outside diameter of torque converter on the back face of the flexplate and in the converter housing only near the flexplate. If a converter-to-flexplate lug, lug weld or converter cover weld leak is suspected, remove the converter and pressure check.
4. Transmission fluid leakage from the bolts inside the converter housing will flow down the back of the torque converter housing. Leakage may be from loose or missing bolts.

5. Engine oil leaks are sometimes incorrectly diagnosed as transaxle converter hub seal leaks. The following areas of possible leakage should also be checked to determine if engine oil leakage is causing the concern.
  1. Leakage at the valve cover gasket may allow engine oil to flow over the torque converter housing or seep down between the torque converter housing and cylinder block causing oil to be present in or at the bottom of the torque converter housing.
  2. Oil galley plug leaks will allow engine oil to flow down the rear face of the cylinder block to the bottom of the torque converter housing.
  3. Leakage at the crankshaft rear oil seal will work back to the flexplate, and then into the torque converter housing.
  4. Leakage at oil pressure sensor will allow engine oil to flow down the rear face of the cylinder block to the bottom of the torque converter housing.

**Leak Check Test**

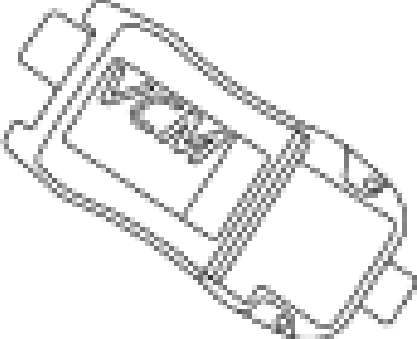
1. Remove the transmission fluid level indicator and note the color of the transmission fluid. Original factory fill transmission fluid is dyed red to aid in determining if leakage is from the engine or transaxle. Unless a considerable amount of makeup transmission fluid has been added or the transmission fluid has been changed, the red color should assist in pinpointing the leak.
2. Remove the torque converter housing cover. Clean off any transmission fluid from the top and bottom of the torque converter housing, the front of the case and rear face of the engine and oil pan. Clean the torque converter area by washing with a suitable nonflammable solvent and blow dry with compressed air.
3. Wash out the torque converter housing, the front of the flexplate and the converter drain plugs. The torque converter housing may be washed out using cleaning solvent and a squirt-type oil can. Blow all washed areas dry with compressed air.
4. 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 transmission fluid leakage. Raise the vehicle on a hoist and run the engine at fast idle, then at engine idle, occasionally shifting to the OVERDRIVE 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. Run the engine until transmission fluid leakage is evident and the probable source of leakage can be determined.

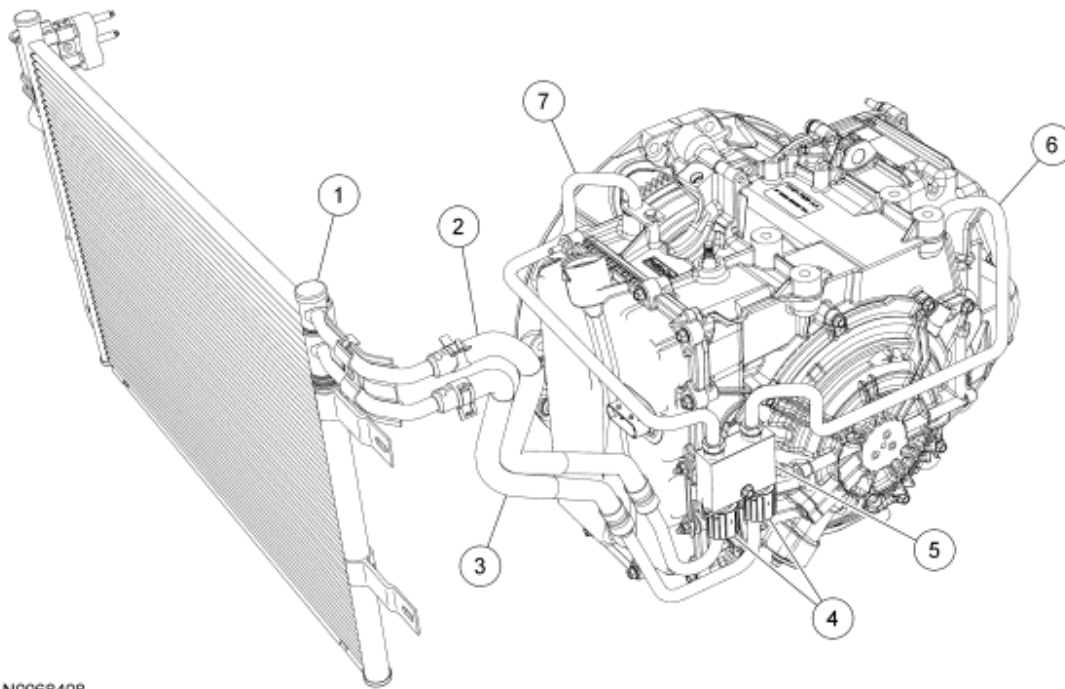
**Leak Check Test With Black Light**

Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye 164-R3701 (Rotunda) is used to detect a transmission fluid leak.

1. Add Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye to the transmission fluid. Use one 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), inside the torque converter housing and the entire case until fluid leakage is evident and the probable source of leakage can be determined.

**TRANSMISSION FLUID COOLER****Special Tools**

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



N0068408

**Fig. 36: Transaxle Cooling**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	19712	Transmission fluid cooler
2	7F113	Transmission fluid cooler outlet tube and hose assembly



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3	7F112	Transmission fluid cooler inlet tube and hose assembly
4	7J081	Secondary latches
5	7H322	Transmission fluid cooler thermal bypass valve
6	7H420	Transmission fluid cooler inlet tube
7	7H420	Transmission fluid cooler outlet tube

When internal wear or damage has occurred in the transaxle, metal particles, clutch plate material or band material may have been carried into the torque converter and transmission fluid cooler. These contaminants are a major cause of recurring transaxle troubles and must be removed from the system before the transaxle is put back into use. Refer to **Transmission Fluid Cooler Backflushing and Cleaning**.

### Transmission Fluid Cooler Flow Test

**NOTE:** The selector lever linkage, selector lever cable adjustment, transmission fluid level and line pressure must be within specification before carrying out this test. Refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article for selector lever linkage and selector lever cable adjustment and refer to **Special Testing Procedures** for line pressure test. The transmission fluid must be above 82°C (180°F) for the cooler by-pass to open to carry out this test.

1. Using a scan tool, run the engine to establish the correct transmission fluid temperature of 82°C (180°F).
2. Remove the transmission fluid level indicator from the transmission fluid filler tube.
3. Place funnel in the transmission fluid filler tube.
4. With the vehicle in NEUTRAL, position it on a hoist. Refer to **JACKING & LIFTING** article.
5. Remove the transmission fluid cooler return tube (rear fitting) from the fitting on the transaxle case.
6. Connect one end of a hose to the cooler return tube and route other end of the hose up to a point where it can be inserted into the funnel at the transmission fluid filler tube.
7. Start the engine and run it at idle with the transmission in NEUTRAL position.
8. When transmission fluid flowing from hose is in a steady stream, a liberal amount of transmission fluid should be observed. "Liberal" is described as about 1L (1 qt) delivered in 30 seconds. If a liberal flow is observed, the test is complete.
9. If the flow is not liberal, stop the engine. Disconnect the hose from the cooler return tube and connect it to the converter outlet tube fitting (front fitting) on the transaxle case.
10. Repeat Steps 7 and 8. If flow is now approximately 1L (1 qt) in 30 seconds, refer to **Transmission Fluid Cooler Backflushing and Cleaning**. If the flow is still not approximately 1L (1 qt) in 30 seconds, repair the pump and/or the torque converter.

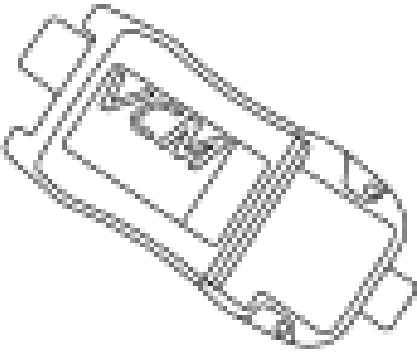
If new transmission fluid cooler tubes need to be installed, refer to **TRANSAXLE/TRANSMISSION COOLING** article.

### DIAGNOSIS BY SYMPTOM

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### Special Tools

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

The Diagnostic Routines give the technician diagnostic information, direction and suggest possible components, using a symptom as a starting point.

The Diagnostic Routines 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 Index 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 Hydraulic/Mechanical Routine listed.

4. Begin with the Electrical Routine, if indicated. Follow the reference or action required statements. Always carry out the OBD tests as required. Never skip steps. Repair as required. If the concern is still present after electrical diagnosis, then proceed to the Hydraulic/Mechanical Routine listed.
5. The Hydraulic/Mechanical Routines list possible hydraulic or mechanical components that could cause the concern. These components are listed in the removal sequence and by most probable cause. All

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components listed must be inspected to make sure of correct repair.

**Diagnosis by Symptom Index**

Title	Routines	
	Electrical <sup>(1)</sup>	Hydraulic/ Mechanical
<b>Engagement Concerns:</b>		
No Forward	201	301
No Reverse	202	302
Harsh Reverse	203	303
Harsh Forward	204	304
Delayed/Soft Reverse	205	305
Delayed/Soft Forward	206	306
No Forward and No Reverse	207	307
Delayed/Soft Forward and Reverse	209	309
<b>Shift Concerns:</b>		
Some or All Shifts Missing	210	310
Timing - Early/Late	211	311
Timing - Erratic/Hunting	212	312
Soft/Slipping	213	313
Harsh	214	314
No 1st Gear, Engages in Higher Gear	215	315
No 1-2 Shift (Automatic)	220	320
No 2-3 Shift (Automatic)	221	321
No 3-4 Shift (Automatic)	222	322
No 4-5 Shift (Automatic)	223	323
No 5-6 Shift (Automatic)	224	324
No 6-5 Shift (Automatic)	225	325
No 5-4 Shift (Automatic)	226	326
No 4-3 Shift (Automatic)	227	327
No 3-2 Shift (Automatic)	228	328
No 2-1 Shift (Automatic)	229	329
Soft/Slipping 1-2 Shift (Automatic)	230	330
Soft/Slipping 2-3 Shift (Automatic)	231	331
Soft/Slipping 3-4 Shift (Automatic)	232	332
Soft/Slipping 4-5 Shift (Automatic)	233	333
Soft/Slipping 5-6 Shift (Automatic)	234	334
Soft/Slipping 6-5 Shift (Automatic)	235	335
Soft/Slipping 5-4 Shift (Automatic)	236	336
Soft/Slipping 4-3 Shift (Automatic)	237	337
Soft/Slipping 3-2 Shift (Automatic)	238	338
Soft/Slipping 2-1 Shift (Automatic)	239	339
Harsh 1-2 Shift (Automatic)	240	340

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Harsh 2-3 Shift (Automatic)	241	341
Harsh 3-4 Shift (Automatic)	242	342
Harsh 4-5 Shift (Automatic)	243	343
Harsh 5-6 Shift (Automatic)	244	344
Harsh 6-5 Shift (Automatic)	245	345
Harsh 5-4 Shift (Automatic)	246	346
Harsh 4-3 Shift (Automatic)	247	347
Harsh 3-2 Shift (Automatic)	248	348
Harsh 2-1 Shift (Automatic)	249	349
<b>Torque Converter Operation Concerns:</b>		
Torque Converter: No Apply	250	350
Torque Converter: Always Applied/Stalls Vehicle	251	351
Torque Converter: Cycling/Shudder/Chatter	252	352
<b>Other Concerns</b>		
Selector Lever Efforts High	261	361
External Leaks	262	362
Vehicle Driveability Concerns	263	363
Noise/Vibration - Forward or Reverse	264	364
Engine Will Not Crank	265	365
No Park Range	266	366
Overheating	267	367

(1) Carry out electrical routine first.

### Dagnostic Routines

#### ENGAGEMENT CONCERN: NO FORWARD

Possible Component		Reference/Action
<b>201 - ELECTRICAL ROUTINE</b>		
<b>Powertrain Control System</b>		
	No electrical concerns	
<b>301 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Transmission Fluid Level</b>		
	Low transmission fluid level	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection.</u></b>
	Transmission fluid condition	Carry out transmission fluid condition check. Refer to <b><u>Preliminary Inspection.</u></b>
<b>Selector Lever Linkage (Internal/External)</b>		
	Damaged or out of adjustment	Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION</u></b>

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		<b>EXTERNAL CONTROLS</b> article.
<b>Incorrect Pressures</b>	Line Pressure Control (LPC) solenoid stuck low	Check pressure at line pressure tap. Carry out Line Pressure Tests and Stall Speed Tests. Refer to <b>Special Testing Procedures</b> . See the Line Pressure Chart for specification. If pressures are low, check the following possible components: <ul style="list-style-type: none"> <li>○ Main control valve body</li> <li>○ Pump assembly</li> <li>○ LPC solenoid</li> </ul>
<b>Main Control Valve Body</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Manual Control Valve - damaged	Adjust bolts to specification. Inspect gaskets for damage. Install new as required. Inspect for damage. Install new as required.
<b>Pump Assembly</b>	Bolts out of torque specification  Porosity/cross leaks/ball missing or leaking Components - damaged	Inspect for damage. Install a new pump as required. Inspect for damage. Install a new pump as required. Inspect for damage. Install a new pump as required.

### ENGAGEMENT CONCERN: NO REVERSE

Possible Component	Reference/Action
<b>202 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
No electrical concerns	
<b>302 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Transmission Fluid Level</b>	
Low transmission fluid level	Check transmission fluid level and adjust as necessary. Refer to <b>Preliminary Inspection</b> .
Transmission fluid condition	Carry out transmission fluid condition check. Refer to <b>Preliminary Inspection</b> .
<b>Selector Lever Linkage (Internal/External)</b>	
Damaged or out of adjustment	Inspect for damage. Repair as required. Verify selector lever

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		cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>Incorrect Pressures</b>	Line Pressure, Line Pressure Control (LPC) Pressure - low	Carry out Line Pressure Tests and Stall Speed Tests. Refer to <b><u>Special Testing Procedures</u></b> . Check pressure at line pressure tap. See the Line Pressure Chart for specifications. If pressures are low, check the following possible components: <ul style="list-style-type: none"> <li>○ Main control valve body</li> <li>○ Pump assembly</li> <li>○ Low/reverse clutch assembly</li> <li>○ Direct clutch assembly</li> <li>○ Shift Solenoid B (SSB), Shift Solenoid D (SSD) and Shift Solenoid E (SSE) solenoids</li> </ul>
<b>Main Control Valve Body</b>	Bolts out of torque specification Gasket and Separator Plate - damaged, off location Manual Control Valve, Springs - stuck, damaged Multiplex Valve, Springs - stuck, damaged Low/Reverse Clutch Valve, Springs - stuck, damaged Direct Clutch Valve, Springs - stuck, damaged	Tighten bolts to specification. Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required.
<b>Pump Assembly</b>	Bolts out of torque	Inspect for damage. Install a new

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	specification Porosity/cross leaks, pump assembly leaking, plugged hole Components damaged	pump as required. Inspect for damage. Install a new pump as required.  Inspect for damage. Install a new pump as required.
<b>Low/Reverse Clutch Assembly</b>	SSD solenoid stuck low  Low/Reverse regulator valve stuck Seals, Piston, Springs - damaged Clearance check out of specification Friction Elements - damaged or worn	Inspect for damage. Install a new solenoid body as required. Refer to <b><u>Solenoid Body Assembly</u></b> . Inspect for damage. Repair as required. Inspect for damage. Repair as required. Inspect for damage. Carry out clearance checks. Inspect for damage. Repair as required.
<b>Direct Clutch Assembly</b>	Seals, Piston, Spring - damaged SSB solenoid  Direct clutch regulator valve Clearance check out of specification Friction Elements - damaged, clearance check incorrect	Inspect for damage. Repair or install new as required. Inspect for damage. Install a new solenoid body as required. Refer to <b><u>Solenoid Body Assembly</u></b> . Inspect for damage. Repair or install new as required. Inspect for damage. Carry out clearance checks. Inspect for damage. Repair as required.

### ENGAGEMENT CONCERN: HARSH REVERSE

Possible Component	Reference/Action
<b>203 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Mass Air Flow (MAF) Sensor, Intake Air	Run On-Board Diagnostic (OBD). Refer to the <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test</u></b>

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	Temperature (IAT) Sensor, Throttle Position (TP) Sensor, Idle Speed Control (ISC), Power Steering Pressure (PSP) Sensor, Engine RPM, Line Pressure Control (LPC) Solenoid, Transmission Fluid Temperature (TFT) sensor, Turbine Shaft Speed (TSS) sensor, Output Shaft Speed (OSS) sensor, Shift Solenoid B (SSB), Shift Solenoid D (SSD) or transaxle solenoid power control circuit open/shorted	<b>A</b> , go to <b>Pinpoint Test B</b> , go to <b>Pinpoint Test C</b> and Go to <b>Pinpoint Test E</b> .
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b>Solenoid Body Strategy</b> .
<b>303 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Incorrect Pressures</b>	Line Pressure, LPC Solenoid Pressure - high	Carry out Line Pressure and Stall Speed Tests. Refer to <b>Special Testing Procedures</b> . Check pressure at line pressure taps. See the Line Pressure Chart for specifications. If high, check the Main Control Valve Body.
<b>Pump Assembly</b>	Bolts out of torque specification	Inspect for damage. Install a new pump as



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	Porosity/cross leaks, pump assembly leaking, plugged hole	required. Inspect for damage. Install a new pump as required.
	Components damaged	Inspect for damage. Install a new pump as required.
<b>Main Controls</b>	Bolts out of torque specification	Tighten bolts to specification.
	Gasket and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Low/Reverse regulator valve - stuck, damaged	Inspect for damage. Install new as required.
	Low/Reverse boost valve - stuck, damaged	Inspect for damage. Install new as required.
	Direct regulator valve - stuck, damaged	Inspect for damage. Install new as required.
	Direct boost valve - stuck, damaged	Inspect for damage. Install new as required.
	SSB mechanically stuck - high	Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> .
	SSD mechanically stuck - high	Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> .
	Main Regulator Valve - stuck, damaged	Inspect for damage. Install new as required.
<b>Low/Reverse Clutch Assembly</b>	SSD solenoid stuck low	Inspect for damage. Install a new solenoid body as required. Refer to <b><u>Solenoid Body Assembly</u></b> .
	Low/Reverse regulator valve stuck	Inspect for damage. Install a new solenoid body as required.
	Seals, Piston, Springs	Inspect for damage.

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	- damaged Clearance check out of specification  Friction Elements - damaged or worn	Repair as required. Inspect for damage. Carry out clearance checks. Inspect for damage. Repair as required.
<b>Direct Clutch Assembly</b>	Seals, Piston, Spring - damaged  SSB solenoid stuck  Direct clutch regulator valve  Clearance check out of specification  Friction Elements - damaged, clearance check incorrect	Inspect for damage. Repair or install new as required. Inspect for damage. Install a new solenoid body as required. Refer to <b><u>Solenoid Body Assembly</u></b> . Inspect for damage. Repair or install new as required. Inspect for damage. Carry out clearance checks. Inspect for damage. Repair or install new as required.

### ENGAGEMENT CONCERN: HARSH FORWARD

Possible Component	Reference/Action
<b>204 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Mass Air Flow (MAF) Sensor, Intake Air Temperature (IAT) Sensor, Throttle Position (TP) Sensor, Idle Speed Control (ISC), Power Steering Pressure (PSP) Sensor, Engine RPM, Line Pressure Control (LPC) Solenoid,
	Run On-Board Diagnostic (OBD). Refer to the <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> , go to <b><u>Pinpoint Test B</u></b> , go to <b><u>Pinpoint Test C</u></b> and Go to <b><u>Pinpoint Test E</u></b> .

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	Transmission Fluid Temperature (TFT) sensor, Turbine Shaft Speed (TSS) sensor, Output Shaft Speed (OSS) sensor, Shift Solenoid A (SSA) or transaxle solenoid power control circuit open/shorted	
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>304 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Incorrect Pressures</b>	Line Pressure, LPC Pressure - high	Carry out Line Pressure and Stall Speed Tests. Refer to <b><u>Special Testing Procedures</u></b> . Check pressure at line pressure taps. See the Line Pressure Chart for specifications. If high, check the Main Control Valve Body, Pump Assembly.
<b>Pump Assembly</b>	Bolts out of torque specification  Porosity/cross leaks, pump assembly leaking, plugged hole  Components damaged	Inspect for damage. Install a new pump as required.  Inspect for damage. Install a new pump as required.  Inspect for damage. Install a new pump as required.
<b>Main Controls</b>	Bolts out of torque specification	Tighten bolts to specification.

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	Gasket and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Forward Clutch Seal - Leaking Between Valve Body and Case	Inspect for damage. Install new as required.
	Forward clutch regulator valve - stuck, damaged	Inspect for damage. Install new as required.
	Forward clutch boost valve - stuck, damaged	Inspect for damage. Install new as required.
	Main Regulator Valve - stuck, damaged	Inspect for damage. Install new as required.
<b>Forward Clutch Assembly</b>	Seals, Piston - worn, damaged	Inspect for damage. Install new as required.
	Friction Elements - damaged	Inspect for damage. Install new as required.
	Wave Spring - damaged	Inspect for damage. Install new as required.

**ENGAGEMENT CONCERN: DELAYED/SOFT REVERSE**

Possible Component		Reference/Action
<b>205 - ELECTRICAL ROUTINE</b>		
<b>Powertrain Control System</b>	Electrical Inputs/Outputs, Transmission Range (TR) Sensor, Vehicle Wiring Harnesses, PCM, Line Pressure Control (LPC) Solenoid, Transmission Fluid Temperature (TFT) sensor	Run On-Board Diagnostic (OBD). Refer to the <b>Introduction - Gasoline Engines</b> article for diagnosis. Go to <b>Pinpoint Test A</b> , go to <b>Pinpoint Test B</b> and Go to <b>Pinpoint Test D</b> .
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as

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		necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>305 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Transmission Fluid Level</b>	Low transmission fluid level	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection</u></b> .
	Transmission fluid condition	Carry out transmission fluid condition check. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Selector Lever Linkage (Internal/External)</b>	Damaged, out of adjustment	Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>Incorrect Pressures</b>	Line Pressure, LPC Pressure - low	Check pressure at line pressure tap. Carry out Line Pressure and Stall Speed Tests. Refer to <b><u>Special Testing Procedures</u></b> . If pressures are low, check the following possible components: Main Control Valve Body, Pump Assembly, Low/Reverse Clutch Assembly, Direct Clutch Assembly.
<b>Main Controls</b>	Solenoid Body Filter Plugged	Inspect for damage. Install a new filter as required.
	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Low/Reverse regulator valve - stuck, damaged	Inspect for damage. Install new as required.
	Low/Reverse boost valve - stuck, damaged	Inspect for damage. Install new as required.
	Direct regulator valve - stuck,	Inspect for damage. Install new as required.

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	<p>damaged</p> <p>Direct boost valve - stuck, damaged</p> <p>Manual Control Valve, Main Regulator Valve, Converter Drain Back Valve, Springs - missing, damaged, misassembled</p> <p>Shift Solenoid B (SSB) stuck low</p> <p>Shift Solenoid D (SSD) stuck low</p>	<p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Repair or install new as required.</p> <p>Inspect for damage. Go to <b><u>Pinpoint Test A</u></b>. Install a new solenoid body as required. Refer to <b><u>Solenoid Body Assembly</u></b>.</p> <p>Inspect for damage. Install a new solenoid body as required. Refer to <b><u>Solenoid Body Assembly</u></b>.</p>
<b>Pump Assembly</b>	Pump Assembly - worn/cross leaks, leaking	Inspect for damage. Install new as required.
<b>Low/Reverse Clutch Assembly</b>	<p>SSD solenoid stuck low</p> <p>Low/Reverse regulator valve stuck</p> <p>Seals, Piston, Springs - damaged</p> <p>Clearance check out of specification</p> <p>Friction Elements - damaged or worn</p>	<p>Inspect for damage. Install a new solenoid body as required. Refer to <b><u>Solenoid Body Assembly</u></b>.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Repair as required.</p> <p>Inspect for damage. Carry out clearance checks.</p> <p>Inspect for damage. Repair as required.</p>
<b>Direct Clutch Assembly</b>	<p>Seals, Piston, Spring - damaged</p> <p>SSB solenoid stuck</p> <p>Direct clutch regulator valve</p> <p>Clearance check out of specification</p> <p>Friction Elements -</p>	<p>Inspect for damage. Repair or install new as required.</p> <p>Inspect for damage. Install a new solenoid body as required. Refer to <b><u>Solenoid Body Assembly</u></b>.</p> <p>Inspect for damage. Repair or install new as required.</p> <p>Inspect for damage. Carry out clearance checks.</p> <p>Inspect for damage. Repair as</p>

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	damaged, clearance check incorrect	required.
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**ENGAGEMENT CONCERN: DELAYED/SOFT FORWARD**

Possible Component		Reference/Action
<b>206 - ELECTRICAL ROUTINE</b>		
<b>Powertrain Control System</b>	Electrical Inputs/Outputs, Transmission Range (TR) Sensor, Vehicle Wiring Harnesses, PCM, Line Pressure Control (LPC) Solenoid, Transmission Fluid Temperature (TFT) sensor, Turbine Shaft Speed (TSS) sensor	Run On-Board Diagnostic (OBD). Refer to the <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> , go to <b><u>Pinpoint Test B</u></b> , go to <b><u>Pinpoint Test C</u></b> and Go to <b><u>Pinpoint Test D</u></b> .
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>306 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Transmission Fluid Level</b>	Low transmission fluid level	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection</u></b> .
	Transmission fluid condition	Carry out transmission fluid condition check. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Selector Lever Linkage</b>	Damaged, out of adjustment	Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>Incorrect Pressures</b>	Line Pressure, Line Pressure Control	Check pressure at line pressure tap. Carry out Line Pressure and Stall

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	(LPC) Pressure - low	Speed Tests. Refer to <b>Special Testing Procedures</b> . If pressures are low, check the following possible components: Main Control Valve Body, Pump Assembly, and Forward Clutch.
<b>Main Controls</b>	Plugged Solenoid Body Filter	Inspect for damage. Install new as required.
	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Forward Clutch Regulator Valve stuck or damaged	Inspect for damage. Install new as required.
	Forward Clutch Boost Valve stuck or damaged	Inspect for damage. Install new as required.
	Main Regulator Valve - stuck, damaged, missing	Inspect for damage. Repair as required.
	LPC solenoid stuck low	Install a new solenoid body. Refer to <b>Solenoid Body Assembly</b> .
	SSA stuck low	Install a new solenoid body. Refer to <b>Solenoid Body Assembly</b> .
<b>Pump Assembly</b>	Bolts out of torque specification	Tighten bolts to specification.
	Worn/cross leaks	Inspect for wear and leaks. Install new as required.
<b>Forward Clutch Assembly</b>	Clutch Plates, Seals, Piston - worn, damaged	Inspect clutches, seals and piston for damage. Install new as required.
	Wave Spring - damaged	Inspect for damage. Install new as required.

### ENGAGEMENT CONCERN: NO FORWARD AND NO REVERSE

Possible Component	Reference/Action
<b>207 - ELECTRICAL ROUTINE</b>	
No electrical concerns	



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**307 - HYDRAULIC/MECHANICAL ROUTINE**

<b>Transmission Fluid Level</b>	Low transmission fluid level	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection</u></b> .
	Transmission fluid condition	Carry out transmission fluid condition check. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Halfshaft</b>	Splines - worn, damaged	Inspect for damage. Repair as required.
	Shaft - misassembled, incorrect	Inspect for damage. Repair as required.
<b>Selector Lever Linkage (Internal/External)</b>	Damaged, out of adjustment	Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>Incorrect Pressures</b>	Line Pressure, Line Pressure Control (LPC) Pressure - low	Carry out Line Pressure and Stall Tests. Check pressure at the line pressure tap. See the Line Pressure Chart for specifications. If pressures are low, check the following possible components: Transmission Fluid Filter and Seal Assembly, Main Control, Pump Assembly, Low/Reverse Clutch Assembly, Forward Clutch Assembly.
<b>Transmission Fluid Filter and Seal Assembly</b>	Plugged, damaged, not correctly seated	Inspect for damage. Install a new filter and seal assembly.
	Filter, Seal - damaged	Inspect for damage. Install a new filter and seal assembly.
<b>Main Controls</b>	Solenoid Body Filter Plugged Manual Valve	Inspect for damage. Install a new filter as required. Inspect for damage. Install new as required.
	Shift Valves	Inspect for damage. Install new as required.

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	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Main Regulator Valve (only if line pressure is out of specification) - damaged Components - damaged, check balls stuck	Tighten bolts to specification.  Inspect for damage. Install new as required.  Inspect for damage. Repair as required.  Inspect for damage. Repair as required.
<b>Pump Assembly</b>	Bolts out of torque specification Porosity/cross leaks - leaking, plugged hole Components damaged - Chain, Sprocket or Shaft Broken	Tighten bolts to specification.  Install a new pump assembly.  Inspect for damage. Install new as required.
<b>Output Shaft</b>	Splines - damaged	Inspect for damage. Repair as required.
<b>Other Possible Components</b>	Turbine Shaft Pump Shaft, Sprockets and Drive Chain Flexplate Sun Gear and Shell Assemblies Planetaries Final Drive Assembly	Inspect for damage. Repair as required. Inspect for damage. Repair as required. Inspect for damage. Repair as required. Inspect for damage. Repair as required. Inspect for damage. Repair as required. Inspect for damage. Repair as required.

**ENGAGEMENT CONCERN: DELAYED/SOFT FORWARD AND REVERSE**

Possible Component	Reference/Action
<b>209 - ELECTRICAL ROUTINE</b>	

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### Powertrain Control System

Electrical  
Inputs/Outputs,  
Transmission Range  
(TR) Sensor,  
Transmission Fluid  
Temperature (TFT)  
Sensor, Turbine  
Shaft Speed (TSS)  
Sensor, Line  
Pressure Control  
(LPC) Solenoid,  
Vehicle Wiring  
Harnesses, PCM

Run On-Board Diagnostic (OBD). Refer to **Introduction - Gasoline Engines** article for diagnosis. Go to **Pinpoint Test A**, go to **Pinpoint Test B**, go to **Pinpoint Test C** and Go to **Pinpoint Test D**.

### Solenoid Body

Incorrect solenoid  
body strategy data  
stored in the PCM

Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to **Solenoid Body Strategy**.

### 309 - HYDRAULIC/MECHANICAL ROUTINE

#### Transmission Fluid Level

Low transmission  
fluid level  
  
Transmission fluid  
condition

Check transmission fluid level and adjust as necessary. Refer to **Preliminary Inspection**.  
Carry out transmission fluid condition check. Refer to **Preliminary Inspection**.

#### Selector Lever Linkage (Internal/External)

Damaged, out of  
adjustment

Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article.

#### Incorrect Pressures

Line Pressure, LPC  
Pressure - low

Carry out Line Pressure and Stall Speed Tests. Refer to **Special Testing Procedures**. See the Line Pressure Chart for specifications. If pressures are low, check the following possible components: Main Control, Pump Assembly and LPC solenoid.

#### Transmission Fluid Filter and Seal Assembly

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	Plugged, damaged, not correctly seated Filter, Seal - damaged	Inspect for damage. Install a new filter and seal assembly. Inspect for damage. Install a new filter and seal assembly.
<b>Main Controls</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Seals, Manual Valve, Main Regulator Valve - missing, damaged or misassembled	Tighten bolts to specification.  Inspect for damage. Install new as required.  Inspect for damage. Repair or install new as required.
<b>Pump Assembly</b>	Bolts out of torque specification Worn/cross leaks - leaking Components damaged	Tighten bolts to specification.  Install a new pump assembly.  Inspect for damage. Install new as required.

### SHIFT CONCERNS: SOME OR ALL SHIFTS MISSING

Possible Component	Reference/Action
<b>210 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Shift Solenoid A (SSA), Shift Solenoid B (SSB), Shift Solenoid C (SSC), Shift Solenoid D (SSD), Shift Solenoid E (SSE), Throttle Position (TP) sensor, Mass Air Flow (MAF) sensor, Output Shaft Speed (OSS) sensor, Turbine Shaft Speed	Run On-Board Diagnostic (OBD). Refer to the <b>Introduction - Gasoline Engines</b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> , go to <b><u>Pinpoint Test C</u></b> and Go to <b><u>Pinpoint Test D</u></b> .

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	(TSS) sensor, Transmission Range (TR) Sensor, Line Pressure Control (LPC) Solenoid	
<b>310 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Transmission Fluid Level</b>	Incorrect transmission fluid level Transmission fluid condition	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection.</u></b> Carry out transmission fluid condition check. Refer to <b><u>Preliminary Inspection.</u></b>
<b>Selector Lever Linkage (Internal/External)</b>	Damaged, out of adjustment	Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>Vehicle Speed Input</b>	Insufficient, erratic or no input received by the PCM from the OSS sensor	Inspect for damage. Repair as required. Go to <b><u>Pinpoint Test C.</u></b>
<b>Transmission Fluid Filter and Seal Assembly</b>	Plugged, damaged, not correctly seated Filter, Seal - damaged	Inspect for damage. Install a new filter and seal assembly. Inspect for damage. Install a new filter and seal assembly.
<b>Main Controls</b>	Regulator and/or Boost Valves - stuck, damaged, misassembled Plugged Solenoid Body Filter	Inspect for damage. Repair or install new as required. Inspect for damage. Install new as required.
<b>End Cover</b>	End Cover Gasket - leaking	Inspect for damage. Repair or install new as required.
<b>Planetary Gear Sets</b>	Damaged	Inspect for damage. Repair as required.
<b>One-Way Clutch Assembly</b>		

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	Damaged	Inspect for damage. Repair as required.
<b>Other Components</b>	Clutches	Inspect for damage. Repair as required.
	Output Shafts (Differential)	Inspect for damage. Repair as required.
	Powerflow Components	Inspect for damage. Repair as required.
	Go to Shift Concerns:	See the appropriate shift concern and routine:
		<ul style="list-style-type: none"> <li>○ Shift Concern: No 1-2, Routine 220/320</li> <li>○ Shift Concern: No 2-3, Routine 221/321</li> <li>○ Shift Concern: No 3-4, Routine 222/322</li> <li>○ Shift Concern: No 4-5, Routine 223/323</li> <li>○ Shift Concern: No 5-6, Routine 224/324</li> <li>○ Shift Concern: No 6-5, Routine 225/325</li> <li>○ Shift Concern: No 5-4, Routine 226/326</li> <li>○ Shift Concern: No 4-3, Routine 227/327</li> <li>○ Shift Concern: No 3-2, Routine 228/328</li> <li>○ Shift Concern: No 2-1, Routine 229/329</li> </ul>

### SHIFT CONCERNS: TIMING - EARLY/LATE

Possible Component	Reference/Action
<b>211 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Shift Solenoid A (SSA), Shift Solenoid B (SSB),	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> , go to <b><u>Pinpoint Test B</u></b> and Go to <b><u>Pinpoint Test C</u></b> .

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	Shift Solenoid C (SSC), Shift Solenoid D (SSD), Shift Solenoid E (SSE), Throttle Position (TP) sensor, Mass Air Flow (MAF) sensor, Output Shaft Speed (OSS) sensor, Intake Air Temperature (IAT) sensor, Engine Coolant Temperature (ECT) sensor, Transmission Fluid Temperature (TFT) sensor, Turbine Shaft Speed (TSS) sensor, Internal Wire Harness, Line Pressure Control (LPC) Solenoid	Carry out Shift Point Road Test. Refer to <b><u>Shift Point Road Test</u></b> and carry out Torque Converter Operation Test. Refer to <b><u>Torque Converter Diagnosis</u></b> .
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>311 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Other</b>	Tire Size	See the specification decal and verify vehicle has original equipment. Changes in tire size will affect shift timing.
<b>Transmission Fluid Level</b>	Low transmission fluid level  Transmission fluid condition	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection</u></b> . Carry out transmission fluid condition check. Refer to

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		<u>Preliminary Inspection.</u>
<b>Selector Lever Linkage (Internal/External)</b>	Damaged, out of adjustment	Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>Main Controls</b>	Plugged Solenoid Body Filter Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Valves, Accumulators, Seals, Springs, Clips, Check balls - damaged, missing, misassembled	Inspect for damage. Install new as required. Tighten bolts to specification. Inspect for damage. Install new as required. Inspect for damage. Repair as required.  See the appropriate shift concern and routine for further diagnosis: <ul style="list-style-type: none"><li>○ Shift Concern: Soft/Slipping 1-2, Routine 230/330</li><li>○ Shift Concern: Soft/Slipping 2-3, Routine 231/331</li><li>○ Shift Concern: Soft/Slipping 3-4, Routine 232/332</li><li>○ Shift Concern: Soft/Slipping 4-5, Routine 233/333</li><li>○ Shift Concern: Soft/Slipping 5-6, Routine 234/334</li><li>○ Shift Concern: Soft/Slipping 6-5, Routine 235/335</li><li>○ Shift Concern: Soft/Slipping 5-4, Routine 236/336</li><li>○ Shift Concern: Soft/Slipping 4-3, Routine 237/337</li><li>○ Shift Concern: Soft/Slipping 3-2, Routine 238/338</li></ul>



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		<ul style="list-style-type: none"> <li>○ Shift Concern: Soft/Slipping 2-1, Routine 239/339</li> </ul>
<b>End Cover</b>	End Cover Gasket - leaking	Inspect for damage. Repair or install new as required.
<b>Planetary Gear Sets</b>	Damaged	Inspect for damage. Repair or install new as required.
<b>One-Way Clutch Assembly</b>	Damaged	Inspect for damage. Repair or install new as required.
<b>Other Components</b>	Clutches  Output Shaft (Differential)  Powerflow Components	Inspect for damage. Repair or install new as required.  Inspect for damage. Repair or install new as required.  Inspect for damage. Repair as required.
<b>Vehicle Speed Input</b>	Insufficient, erratic or no input received by the PCM from the OSS or TSS sensors	Inspect for damage. Repair as required. Go to <b><u>Pinpoint Test C</u></b> .
<b>Transmission Fluid Filter and Seal Assembly</b>	Plugged, damaged, not correctly seated Filter, Seal - damaged	Inspect for damage. Install a new filter and seal assembly.  Inspect for damage. Install a new filter and seal assembly.

### SHIFT CONCERNS: TIMING - ERRATIC/HUNTING

Possible Component	Reference/Action
<b>212 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>  Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Torque Converter Clutch (TCC) and Shift Solenoid A (SSA), Shift Solenoid B (SSB), Shift Solenoid C (SSC), Shift	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> , go to <b><u>Pinpoint Test B</u></b> , go to <b><u>Pinpoint Test C</u></b> , Go to <b><u>Pinpoint Test D</u></b> and Go to <b><u>Pinpoint Test E</u></b> .

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	Solenoid D (SSD), Shift Solenoid E (SSE), Throttle Position (TP) sensor, Output Shaft Speed (OSS) sensor, Engine Coolant Temperature (ECT) sensor, Intake Air Temperature (IAT) sensor, Mass Air Flow (MAF) sensor, Transmission Range (TR) sensor, Transmission Fluid Temperature (TFT) sensor, Turbine Shaft Speed (TSS) sensor	Carry out Shift Point Road Test. Refer to <b><u>Shift Point Road Test</u></b> and carry out Torque Converter Operation Test. Refer to <b><u>Torque Converter Diagnosis</u></b> .
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>312 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Transmission Fluid Level</b>	Low transmission fluid level  Transmission fluid condition	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection</u></b> . Carry out transmission fluid condition check. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Selector Lever Linkage (Internal/External)</b>	Damaged, out of adjustment	Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.

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<b>Main Control Valve Body</b>	Plugged Solenoid Body Filter	Inspect for damage. Install new as required.
	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Valves, Seals, Clips, Check Ball - stuck, damaged, contaminated	Inspect for damage. Repair or install new as required.
<b>End Cover</b>	End Cover Gasket - leaking	Inspect for damage. Repair or install new as required.
<b>Vehicle Speed Input</b>	Insufficient, erratic or no input received by the PCM from the OSS or TSS sensor	Inspect for damage. Repair as required. Go to <b><u>Pinpoint Test C.</u></b>
<b>Torque Converter Clutch (TCC)</b>		See Torque Converter Cycling (Routine 254/354).
<b>Planetary Gear Sets</b>	Damaged	Inspect for damage. Repair as required.
<b>Clutch Assemblies</b>	Damaged Clutch Plates, Pistons, Seals, Return Springs	Inspect for damage. Repair or install new as required.
<b>Transmission Fluid Filter and Seal Assembly</b>	Plugged, damaged, not correctly seated Filter, Seal - damaged	Inspect for damage. Install a new filter and seal assembly. Inspect for damage. Install a new filter and seal assembly.
<b>For Diagnosis Related to a Specific Shift</b>		See the appropriate shift concern and routine for further diagnosis: <ul style="list-style-type: none"><li>○ Shift Concern: No 1-2, Routine 220/320</li><li>○ Shift Concern: No 2-3, Routine 221/321</li></ul>

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- Shift Concern: No 3-4, Routine 222/322
- Shift Concern: No 4-5, Routine 223/323
- Shift Concern: No 5-6, Routine 224/324
- Shift Concern: No 6-5, Routine 225/325
- Shift Concern: No 5-4, Routine 226/326
- Shift Concern: No 4-3, Routine 227/327
- Shift Concern: No 3-2, Routine 228/328
- Shift Concern: No 2-1, Routine 229/329
- Shift Concern: Soft/Slip 1-2, Routine 230/330
- Shift Concern: Soft/Slip 2-3, Routine 231/331
- Shift Concern: Soft/Slip 3-4, Routine 232/332
- Shift Concern: Soft/Slip 4-5, Routine 233/333
- Shift Concern: Soft/Slip 5-6, Routine 234/334
- Shift Concern: Soft/Slip 6-5, Routine 235/335
- Shift Concern: Soft/Slip 5-4, Routine 236/336
- Shift Concern: Soft/Slip 4-3, Routine 237/337
- Shift Concern: Soft/Slip 3-2, Routine 238/338
- Shift Concern: Soft/Slip 2-1, Routine 239/339
- Shift Concern: Harsh 1-2, Routine 240/340
- Shift Concern: Harsh 2-3, Routine 241/341
- Shift Concern: Harsh 3-4, Routine 242/342

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- Shift Concern: Harsh 4-5, Routine 243/343
- Shift Concern: Harsh 5-6, Routine 244/344
- Shift Concern: Harsh 6-5, Routine 245/345
- Shift Concern: Harsh 5-4, Routine 246/346
- Shift Concern: Harsh 4-3, Routine 247/347
- Shift Concern: Harsh 3-2, Routine 248/348
- Shift Concern: Harsh 2-1, Routine 249/349

### SHIFT CONCERNS: FEEL - SOFT/SLIPPING

Possible Component	Reference/Action
<b>213 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Line Pressure Control (LPC) Solenoid, Mass Air Flow (MAF) sensor, Throttle Position (TP) sensor, Engine Coolant Temperature (ECT) sensor, Intake Air Temperature (IAT) sensor, Transmission Fluid Temperature (TFT) sensor, Turbine Shaft Speed (TSS) sensor, Output Shaft Speed (OSS) sensor	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> , go to <b><u>Pinpoint Test B</u></b> and Go to <b><u>Pinpoint Test C</u></b> .
<b>Solenoid Body</b>	
Incorrect solenoid body strategy data	Verify solenoid body strategy data stored in the PCM, download new

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	stored in the PCM	identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>313 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Transmission Fluid</b>	Low transmission fluid level	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection</u></b> .
	Transmission fluid condition	Carry out transmission fluid condition check. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Selector Lever Linkage (Internal/External)</b>	Damaged, out of adjustment	Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>Incorrect Pressures</b>	Low LPC pressure	Check pressures at line pressure taps. Carry out Line Pressure and Stall Speed Tests. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specification. If pressures are low or all shifts are soft/slipping refer to <b><u>Main Control</u></b> . If pressures are OK and a specific shift is soft/slipping, see the following chart: <ul style="list-style-type: none"><li>○ Soft/Slipping Shift 1-2, Routine 230/330</li><li>○ Soft/Slipping Shift 2-3, Routine 231/331</li><li>○ Soft/Slipping Shift 3-4, Routine 232/332</li><li>○ Soft/Slipping Shift 4-5, Routine 233/333</li><li>○ Soft/Slipping Shift 5-6, Routine 234/334</li><li>○ Soft/Slipping Shift 6-5, Routine 235/335</li><li>○ Soft/Slipping Shift 5-4,</li></ul>

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		Routine 236/336 ○ Soft/Slipping Shift 4-3, Routine 237/337 ○ Soft/Slipping Shift 3-2, Routine 238/338 ○ Soft/Slipping Shift 2-1, Routine 239/339
<b>Transmission Fluid Filter and Seal Assembly</b>	Plugged, damaged, not correctly seated Filter, Seal - damaged	Inspect for damage. Install a new filter and seal assembly. Inspect for damage. Install a new filter and seal assembly.
<b>Main Controls</b>	Plugged Solenoid Body Filter Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Sticking or Binding Valves, Check Balls, Clips, Springs - damaged, missing	Inspect for damage. Install new as required. Tighten bolts to specification. Inspect for damage. Install new as required. Inspect for damage. Repair or install new as required.
<b>Pump Assembly</b>	Pump Assembly - worn/cross leaks, leaking	Inspect for damage. Install new as required.

### SHIFT CONCERNS: FEEL - HARSH

Possible Component	Reference/Action
<b>214 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Line Pressure Control (LPC) Solenoid, Mass Air Flow (MAF) sensor, Throttle Position (TP) sensor, Output Shaft Speed (OSS)
	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> , go to <b><u>Pinpoint Test B</u></b> , go to <b><u>Pinpoint Test C</u></b> and Go to <b><u>Pinpoint Test</u></b>

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	sensor, Turbine Shaft Speed (TSS) sensor, Engine Coolant Temperature (ECT) sensor, Intake Air Temperature (IAT) sensor, Power Steering Pressure (PSP) switch, Transmission Fluid Temperature (TFT) sensor, Transmission Range (TR) Sensor, Shift Solenoid A (SSA), Shift Solenoid B (SSB), Shift Solenoid C (SSC), Shift Solenoid D (SSD) and Shift Solenoid E (SSE)	<b>D.</b>
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>314 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Transmission Fluid Level</b>	Low transmission fluid level  Transmission fluid condition	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection</u></b> . Carry out transmission fluid condition check. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Incorrect Pressures</b>	High LPC pressure	Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing</u></b>



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**Procedures.** See the Line Pressure Chart for specifications. If pressures are high or all shifts are harsh, go to Main Control. Refer to **Main Control**. If pressures are OK and a specific shift is harsh. See the appropriate shift routine in the following chart:

- Shift 1-2, Routine 240/340
- Shift 2-3, Routine 241/341
- Shift 3-4, Routine 242/342
- Shift 4-5, Routine 243/343
- Shift 5-6, Routine 244/344
- Shift 6-5, Routine 245/345
- Shift 5-4, Routine 246/346
- Shift 4-3, Routine 247/347
- Shift 3-2, Routine 248/348
- Shift 2-1, Routine 249/349

**Main Control Valve Body**

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	Plugged Solenoid Body Filter	Inspect for damage. Install new as required.
	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Valves, Springs, Clips, Check Balls - stuck, damaged	Inspect for damage. Repair or install new as required.
<b>Pump Assembly</b>	Pump Assembly - worn/cross leaks, leaking	Inspect for damage. Install new as required.

**SHIFT CONCERNS: NO 1ST GEAR, ENGAGES IN HIGHER GEAR**

Possible Component	Reference/Action
<b>215 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Shift Solenoid A (SSA), Shift Solenoid B (SSB), Shift Solenoid C (SSC), Shift Solenoid D (SSD), Shift Solenoid E (SSE), Output Shaft Speed (OSS) sensor and Turbine Shaft Speed (TSS) sensor, transaxle solenoid power control circuit - no voltage at transaxle connector	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> , Go to <b><u>Pinpoint Test C</u></b> and Go to <b><u>Pinpoint Test E</u></b> . Repair as required. Clear codes. Road Test and rerun On-Board Diagnostic (OBD).
<b>315 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control Valve Body</b>	
Plugged Solenoid Body Filter (SSA Filter Plate)	Inspect for damage. Install new as required.
Bolts out of torque	Tighten bolts to

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	<p>specification Gaskets and Separator Plate - damaged, off location Forward Clutch Regulator Valve, Springs, Clips - stuck, damaged, missing, misassembled Shift Solenoid - stuck, damaged</p> <p>For diagnosis related to a specific gear, use the scan tool to select the gear</p>	<p>specification. Inspect for damage. Install new as required.</p> <p>Inspect for damage. Repair as required.</p> <p>Inspect for damage. Go to <b>Pinpoint Test A</b>. Repair as required. Activate solenoid using the scan tool. Repair as required.</p> <p>See the following routines:</p> <ul style="list-style-type: none"> <li>○ Shift 1-2, Routine 220/320</li> <li>○ Shift 2-3, Routine 221/321</li> <li>○ Shift 3-4, Routine 222/322</li> <li>○ Shift 4-5, Routine 223/323</li> <li>○ Shift 5-6, Routine 224/324</li> </ul>
<b>Mechanical</b>	Clutches or Seals - damaged or worn	Inspect for damage. Repair or install new as required.

### SHIFT CONCERNS: NO 1-2 SHIFT (AUTOMATIC)

Possible Component	Reference/Action
<b>220 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical	Run On-Board

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Inputs/Outputs,  
Vehicle Wiring  
Harnesses, PCM,  
Shift Solenoid C  
(SSC) and  
Transmission Range  
(TR) Sensor

Diagnostic (OBD).  
Refer to  
**Introduction -  
Gasoline Engines**  
article for diagnosis.  
Go to **Pinpoint Test  
A** and Go to **Pinpoint  
Test D.**

### 320 - HYDRAULIC/MECHANICAL ROUTINE

#### Incorrect Pressures

Line pressure

Check pressure at  
line pressure tap.  
Carry out Line  
Pressure Test. Refer  
to **Special Testing  
Procedures.** See the  
Line Pressure Chart  
for specifications. If  
not OK, check Main  
Control. Refer to  
**Main Control.**

#### Main Control Valve Body

Bolts out of torque  
specification  
Gaskets and  
Separator Plate -  
damaged, off  
location  
Intermediate  
Regulator Valve,  
Springs, Clips -  
loose, stuck, missing,  
misassembled stuck  
off  
SSC not functioning  
correctly

Tighten bolts to  
specification.  
Inspect for damage.  
Install new as  
required.  
  
Inspect for damage.  
Repair or install new  
as required.  
  
Activate solenoid  
using scan tool. Refer  
to **Output State  
Control (OSC)  
Mode.** Go to  
**Pinpoint Test A.**  
Install a new solenoid  
body. Refer to  
**Solenoid Body  
Assembly.** Download  
a new solenoid body  
strategy into the  
PCM. Refer to

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		<b><u>Solenoid Body Strategy.</u></b>
<b>Intermediate Clutch Assembly - Failed Off</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Low/Reverse Clutch Assembly - Failed On</b>	Piston - damaged	Inspect for damage. Install new as required.
	Friction - overheated	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Pump Assembly</b>	Worn/cross leaks	Inspect for damage. Install new as required.
	Component damaged	Inspect for damage. Install a new pump assembly as required.
<b>Low One-Way Clutch Assembly</b>	Not overrunning, damaged	Inspect for damage. Install new as required.
<b>Planetary Carrier</b>	Damaged	Inspect for damage. Install new as required.

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**SHIFT CONCERNS: NO 2-3 SHIFT (AUTOMATIC)**

<b>Possible Component</b>		<b>Reference/Action</b>
<b>221 - ELECTRICAL ROUTINE</b>		
<b>Powertrain Control System</b>	Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Shift Solenoid B (SSB) Failed, Shift Solenoid C (SSC) Stuck On and Transmission Range (TR) Sensor	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> and Go to <b><u>Pinpoint Test D</u></b> .
<b>321 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Incorrect Pressures</b>	Line pressure	Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specifications. If not OK, check Main Control. Refer to <b><u>Main Control</u></b> .
<b>Main Control Valve Body</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, stuck off Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, stuck	Tighten bolts to specification. Inspect for damage. Install new as required. Inspect for damage. Repair or install new as required. Inspect for damage. Repair or install new as required.

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	on SSB or SSC not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Direct Clutch Assembly - Failed Off</b>	Seals - damaged  Piston - damaged  Friction - damaged, worn  Cylinder Hub - damaged  Return Spring Assembly - damaged	Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.
<b>Intermediate Clutch Assembly - Failed On</b>	Seals - damaged  Piston - damaged  Friction - damaged, worn  Cylinder Hub - damaged  Return Spring	Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage.

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	Assembly - damaged	Install new as required.
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**SHIFT CONCERNS: NO 3-4 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
<b>222 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Shift Solenoid D (SSD) Failed, Shift Solenoid B (SSB) Stuck On and Transmission Range (TR) Sensor	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> and Go to <b><u>Pinpoint Test D</u></b> .
<b>322 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control Valve Body</b>	
Bolts out of torque specification	Tighten bolts to specification.
Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
Overdrive Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed off	Inspect for damage. Repair or install new as required.
Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed on	Inspect for damage. Repair or install new as required.
SSD not functioning correctly, SSB stuck on	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body</u></b>



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		<b><u>Assembly.</u></b> Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy.</u></b>
<b>Overdrive Clutch Assembly - Failed Off</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Direct Clutch Assembly - Failed On</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

### SHIFT CONCERNS: NO 4-5 SHIFT (AUTOMATIC)

Possible Component		Reference/Action
<b>223 - ELECTRICAL ROUTINE</b>		
<b>Powertrain Control System</b>		
	Electrical Inputs/Outputs, Vehicle Wiring	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go

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	Harnesses, PCM, Shift Solenoid B (SSB) Failed, Shift Solenoid A (SSA) Stuck On, Transmission Range (TR) Sensor	to <b><u>Pinpoint Test A</u></b> and Go to <b><u>Pinpoint Test D</u></b> .
<b>Transmission Control Switch (TCS)/Overdrive (O/D) Cancel Switch</b>	Switch control circuit open/shorted, switch damaged	Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>323 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Main Control Valve Body</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed off Forward Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed on SSB not functioning correctly, SSA stuck on	Tighten bolts to specification.  Inspect for damage. Install new as required.  Inspect for damage. Repair or install new as required.  Inspect for damage. Repair or install new as required.  Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Direct Clutch Assembly - Failed Off</b>	Seals - damaged	Inspect for damage. Install new as required.

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	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Forward Clutch Assembly - Failed On</b>		
	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

### SHIFT CONCERNS: NO 5-6 SHIFT (AUTOMATIC)

Possible Component	Reference/Action
<b>224 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Shift Solenoid C (SSC) Failed, Shift Solenoid B (SSB) Stuck On, Transmission Range (TR) Sensor	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> and Go to <b><u>Pinpoint Test D</u></b> .
<b>Transmission Control Switch (TCS)/Overdrive (O/D) Cancel Switch</b>	
Switch control circuit open/shorted, switch damaged	Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>324 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control Valve Body</b>	
Bolts out of torque	Tighten bolts to specification.

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	<p>specification</p> <p>Gaskets and Separator Plate - damaged, off location</p> <p>Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed off</p> <p>Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed on</p> <p>SSC not functioning correctly, SSB stuck on</p>	<p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Repair or install new as required.</p> <p>Inspect for damage. Repair or install new as required.</p> <p>Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b>. Go to <b><u>Pinpoint Test A</u></b>. Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b>. Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b>.</p>
<b>Intermediate Clutch Assembly - Failed Off</b>	<p>Seals - damaged</p> <p>Piston - damaged</p> <p>Friction - damaged, worn</p> <p>Cylinder Hub - damaged</p> <p>Return Spring Assembly - damaged</p>	<p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p>
<b>Direct Clutch Assembly - Failed On</b>	<p>Seals - damaged</p> <p>Piston - damaged</p> <p>Friction - damaged,</p>	<p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as</p>

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	worn Cylinder Hub - damaged Return Spring Assembly - damaged	required. Inspect for damage. Install new as required. Inspect for damage. Install new as required.
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### SHIFT CONCERNS: NO 6-5 SHIFT (AUTOMATIC)

Possible Component		Reference/Action
<b>225 - ELECTRICAL ROUTINE</b>		
<b>Powertrain Control System</b>		
	Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Shift Solenoid B (SSB) Failed, Shift Solenoid C (SSC) Stuck On, Transmission Range (TR) Sensor	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> and Go to <b><u>Pinpoint Test D</u></b> .
<b>325 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Main Control Valve Body</b>		
	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed on Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed off SSC not functioning correctly, SSB stuck on	Tighten bolts to specification. Inspect for damage. Install new as required.  Inspect for damage. Repair or install new as required.  Inspect for damage. Repair or install new as required.  Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC)</u></b>

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		<b>Mode.</b> Go to <b><u>Pinpoint Test A.</u></b> Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly.</u></b> Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy.</u></b>
<b>Intermediate Clutch Assembly - Failed On</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Direct Clutch Assembly - Failed Off</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: NO 5-4 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
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### 226 - ELECTRICAL ROUTINE

#### Powertrain Control System

Electrical  
Inputs/Outputs,  
Vehicle Wiring  
Harnesses, PCM,  
Shift Solenoid A  
(SSA) Failed, Shift  
Solenoid B (SSB)  
Stuck On,  
Transmission Range  
(TR) Sensor

Run On-Board  
Diagnostic (OBD).  
Refer to  
**Introduction -  
Gasoline Engines**  
article for diagnosis.  
Go to **Pinpoint Test  
A** and Go to **Pinpoint  
Test D**.

### 326 - HYDRAULIC/MECHANICAL ROUTINE

#### Main Control Valve Body

Bolts out of torque  
specification  
Gaskets and  
Separator Plate -  
damaged, off  
location  
Direct Regulator and  
Boost Valves,  
Springs, Clips -  
loose, stuck, missing,  
misassembled, clutch  
failed on  
Forward Regulator  
and Boost Valves,  
Springs, Clips -  
loose, stuck, missing,  
misassembled, clutch  
failed off  
SSA not functioning  
correctly, SSB stuck  
on

Tighten bolts to  
specification.  
Inspect for damage.  
Install new as  
required.  
Inspect for damage.  
Repair or install new  
as required.  
Inspect for damage.  
Repair or install new  
as required.  
Activate solenoid  
using scan tool. Refer  
to **Output State  
Control (OSC)  
Mode**. Go to  
**Pinpoint Test A**.  
Install a new solenoid  
body. Refer to  
**Solenoid Body  
Assembly**. Download  
a new solenoid body  
strategy into the  
PCM. Refer to  
**Solenoid Body  
Strategy**.

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**Direct Clutch Assembly - Failed On**

Seals - damaged	Inspect for damage. Install new as required.
Piston - damaged	Inspect for damage. Install new as required.
Friction - damaged, worn	Inspect for damage. Install new as required.
Cylinder Hub - damaged	Inspect for damage. Install new as required.
Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**Forward Clutch Assembly - Failed Off**

Seals - damaged	Inspect for damage. Install new as required.
Piston - damaged	Inspect for damage. Install new as required.
Friction - damaged, worn	Inspect for damage. Install new as required.
Cylinder Hub - damaged	Inspect for damage. Install new as required.
Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: NO 4-3 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
<b>227 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Shift Solenoid B (SSB) Failed, Shift Solenoid D (SSD) Stuck On, Transmission Range	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> and Go to <b><u>Pinpoint Test D</u></b> .



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	(TR) Sensor	
<b>327 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Main Control Valve Body</b>	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Overdrive Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed on	Inspect for damage. Repair or install new as required.
	Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed off	Inspect for damage. Repair or install new as required.
	SSB not functioning correctly, SSD stuck on	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Overdrive Clutch Assembly - Failed On</b>		
	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.

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	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Direct Clutch Assembly - Failed Off</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: NO 3-2 SHIFT (AUTOMATIC)**

Possible Component		Reference/Action
<b>228 - ELECTRICAL ROUTINE</b>		
<b>Powertrain Control System</b>	Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Shift Solenoid C (SSC) Failed, Shift Solenoid B (SSB) Stuck On, Transmission Range (TR) Sensor	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> and Go to <b><u>Pinpoint Test D</u></b> .
<b>328 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Incorrect Pressures</b>	Line pressure	Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart

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		for specifications. If not OK, check Main Control Valve Body.
<b>Main Control Valve Body</b>	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, stuck on	Inspect for damage. Repair or install new as required.
	Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, stuck off	Inspect for damage. Repair or install new as required.
	SSB or SSC not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Direct Clutch Assembly - Failed On</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as

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	Cylinder Hub - damaged	required. Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Intermediate Clutch Assembly - Failed Off</b>		
	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: NO 2-1 SHIFT (AUTOMATIC)**

Possible Component		Reference/Action
<b>229 - ELECTRICAL ROUTINE</b>		
<b>Powertrain Control System</b>	Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Shift Solenoid C (SSC) Stuck On, Transmission Range (TR) Sensor	Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> and Go to <b><u>Pinpoint Test D</u></b> .
<b>329 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Incorrect Pressures</b>	Line pressure	Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart

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		for specifications. If not OK, check Main Control Valve Body.
<b>Main Control Valve Body</b>	<p>Bolts out of torque specification</p> <p>Gaskets and Separator Plate - damaged, off location</p> <p>Intermediate Regulator Valve, Springs, Clips - loose, stuck, missing, misassembled, stuck on</p> <p>SSC not functioning correctly, stuck on</p>	<p>Tighten bolts to specification.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Repair or install new as required.</p> <p>Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b>. Go to <b><u>Pinpoint Test A</u></b>.</p> <p>Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b>. Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b>.</p>
<b>Intermediate Clutch Assembly - Failed On</b>	<p>Seals - damaged</p> <p>Piston - damaged</p> <p>Friction - damaged, worn</p> <p>Cylinder Hub - damaged</p> <p>Return Spring Assembly - damaged</p>	<p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p>

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**Low One-Way Clutch Assembly**

Damaged - Not holding

Inspect for damage. Install new as required.

**Planetary Carrier**

Damaged

Inspect for damage. Install new as required.

**SHIFT CONCERNS: SOFT/SLIPPING 1-2 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
<b>230 - ELECTRICAL ROUTINE</b>	
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>330 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Incorrect Pressures</b>	Line pressure Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specifications. If not OK, check Main Control Valve Body.
<b>Main Control Valve Body</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Intermediate Regulator Valve, Springs, Clips - loose, stuck, missing, binding, misassembled Tighten bolts to specification. Inspect for damage. Install new as required. Inspect for damage. Repair or install new as required.

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	Shift Solenoid C (SSC) not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Intermediate Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Pump Assembly</b>	Worn/cross leaks	Inspect for damage. Install new as required.
	Component damaged	Inspect for damage. Install a new pump assembly if required.

**SHIFT CONCERNS: SOFT/SLIPPING 2-3 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
<b>231 - ELECTRICAL ROUTINE</b>	
<b>Solenoid Body</b>	
Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download

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		new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>331 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Incorrect Pressures</b>	Line pressure	Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specifications. If not OK, check Main Control. Refer to <b><u>Main Control</u></b> .
<b>Main Control Valve Body</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled Multiplex Valve, Springs, Clips - loose, stuck, missing, binding, misassembled Shift Solenoid B (SSB) or Shift Solenoid C (SSC) not functioning correctly	Tighten bolts to specification. Inspect for damage. Install new as required.  Inspect for damage. Repair or install new as required.  Inspect for damage. Repair or install new as required.  Inspect for damage. Repair or install new as required.  Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to



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		<b><u>Pinpoint Test A.</u></b> Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly.</u></b> Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy.</u></b>
<b>Direct Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Intermediate Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: SOFT/SLIPPING 3-4 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
<b>232 - ELECTRICAL ROUTINE</b>	

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### Solenoid Body

Incorrect solenoid body strategy data stored in the PCM

Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to **Solenoid Body Strategy**.

### 332 - HYDRAULIC/MECHANICAL ROUTINE

#### Main Control Valve Body

Bolts out of torque specification  
Gaskets and Separator Plate - damaged, off location  
Overdrive Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled  
Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled  
Shift Solenoid D (SSD) or Shift Solenoid B (SSB) not functioning correctly

Tighten bolts to specification.  
Inspect for damage. Install new as required.  
Inspect for damage. Repair or install new as required.  
Inspect for damage. Repair or install new as required.  
Activate solenoid using scan tool. Refer to **Output State Control (OSC) Mode**. Go to **Pinpoint Test A**. Install a new solenoid body. Refer to **Solenoid Body Assembly**. Download a new solenoid body strategy into the PCM. Refer to **Solenoid Body Strategy**.

#### Overdrive Clutch Assembly

Seals - damaged

Inspect for damage. Install new as

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	Piston - damaged	required. Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Direct Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: SOFT/SLIPPING 4-5 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
<b>233 - ELECTRICAL ROUTINE</b>	
<b>Solenoid Body</b>	
Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>333 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control Valve Body</b>	
Bolts out of torque specification	Tighten bolts to specification.

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	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled	Inspect for damage. Repair or install new as required.
	Forward Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled	Inspect for damage. Repair or install new as required.
	Shift Solenoid B (SSB) or Shift Solenoid A (SSA) not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Direct Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

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**Forward Clutch Assembly**

Seals - damaged	Inspect for damage. Install new as required.
Piston - damaged	Inspect for damage. Install new as required.
Friction - damaged, worn	Inspect for damage. Install new as required.
Cylinder Hub - damaged	Inspect for damage. Install new as required.
Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: SOFT/SLIPPING 5-6 SHIFT (AUTOMATIC)**

Possible Component		Reference/Action
<b>234 - ELECTRICAL ROUTINE</b>		
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>334 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Main Control Valve Body</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled Direct Regulator and Boost Valves, Springs, Clips -	Tighten bolts to specification. Inspect for damage. Install new as required.  Inspect for damage. Repair or install new as required.  Inspect for damage. Repair or install new as required.

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	loose, stuck, binding, missing, misassembled Shift Solenoid C (SSC) or Shift Solenoid B (SSB) not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Intermediate Clutch Assembly</b>	Seals - damaged  Piston - damaged  Friction - damaged, worn  Cylinder Hub - damaged  Return Spring Assembly - damaged	Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.
<b>Direct Clutch Assembly</b>	Seals - damaged  Piston - damaged  Friction - damaged, worn  Cylinder Hub - damaged	Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.

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Return Spring Assembly - damaged	Inspect for damage. Install new as required.
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**SHIFT CONCERNS: SOFT/SLIPPING 6-5 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
<b>235 - ELECTRICAL ROUTINE</b>	
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>335 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Control Valve Body</b>	Bolts out of torque specification Tighten bolts to specification. Gaskets and Separator Plate - damaged, off location Inspect for damage. Install new as required. Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled Inspect for damage. Repair or install new as required. Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled Inspect for damage. Repair or install new as required. Shift Solenoid C (SSC) or Shift Solenoid B (SSB) not functioning correctly Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download

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		a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Intermediate Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Direct Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: SOFT/SLIPPING 5-4 SHIFT (AUTOMATIC)**

<b>Possible Component</b>		<b>Reference/Action</b>
<b>236 - ELECTRICAL ROUTINE</b>		
<b>Solenoid Body</b>		
	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification



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		and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>336 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Main Control Valve Body</b>		
	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed on Forward Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed off Shift Solenoid A (SSA) not functioning correctly, Shift Solenoid B (SSB) stuck on	Tighten bolts to specification. Inspect for damage. Install new as required. Inspect for damage. Repair or install new as required. Inspect for damage. Repair or install new as required. Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Direct Clutch Assembly</b>		
	Seals - damaged  Piston - damaged  Friction - damaged,	Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage.

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	worn	Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Forward Clutch Assembly</b>		
	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: SOFT/SLIPPING 4-3 SHIFT (AUTOMATIC)**

Possible Component		Reference/Action
<b>237 - ELECTRICAL ROUTINE</b>		
<b>Solenoid Body</b>		
	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>337 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Main Control Valve Body</b>		
	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Overdrive Regulator	Inspect for damage.

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	and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled	Repair or install new as required.
	Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled, clutch failed off	Inspect for damage. Repair or install new as required.
	Shift Solenoid B (SSB) or Shift Solenoid D (SSD) not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Overdrive Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Direct Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.

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	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: SOFT/SLIPPING 3-2 SHIFT (AUTOMATIC)**

Possible Component		Reference/Action
<b>238 - ELECTRICAL ROUTINE</b>		
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>338 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Incorrect Pressures</b>	Line pressure	Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specifications. If not OK, check Main Control Valve Body.
<b>Main Control Valve Body</b>	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Direct Regulator and Boost Valves,	Inspect for damage. Repair or install new

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	Springs, Clips - loose, stuck, binding, missing, misassembled Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled Multiplex Valve, Spring, Clip - loose, stuck, binding, missing, misassembled Shift Solenoid B (SSB) or Shift Solenoid C (SSC) not functioning correctly	as required.  Inspect for damage. Repair or install new as required.  Inspect for damage. Repair or install new as required.  Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Direct Clutch Assembly</b>	Seals - damaged  Piston - damaged  Friction - damaged, worn  Cylinder Hub - damaged  Return Spring Assembly - damaged	Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.
<b>Intermediate Clutch Assembly</b>		

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	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: SOFT/SLIPPING 2-1 SHIFT (AUTOMATIC)**

Possible Component		Reference/Action
<b>239 - ELECTRICAL ROUTINE</b>		
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>339 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Incorrect Pressures</b>	Line pressure	Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specifications. If not OK, check Main Control Valve Body.
<b>Main Control Valve Body</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off	Tighten bolts to specification. Inspect for damage. Install new as required.

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	location Intermediate Regulator Valve, Springs, Clips - loose, stuck, binding, missing, misassembled Shift Solenoid C (SSC) not functioning correctly	Inspect for damage. Repair or install new as required.  Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Intermediate Clutch Assembly</b>	Seals - damaged  Piston - damaged  Friction - damaged, worn  Cylinder Hub - damaged  Return Spring Assembly - damaged	Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required.
<b>Low One-Way Clutch Assembly</b>	Damaged - not holding	Inspect for damage. Install new as required.
<b>Planetary Carrier</b>	Damaged	Inspect for damage. Install new as required.

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**SHIFT CONCERNS: HARSH 1-2 SHIFT (AUTOMATIC)**

<b>Possible Component</b>		<b>Reference/Action</b>
<b>240 - ELECTRICAL ROUTINE</b>		
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>340 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Incorrect Pressures</b>	Line pressure	Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specifications. If not OK, check Main Control Valve Body.
<b>Main Control Valve Body</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Intermediate Regulator Valve, Springs, Clips - loose, stuck, missing, binding, misassembled Shift Solenoid C (SSC) not functioning correctly	Tighten bolts to specification. Inspect for damage. Install new as required.  Inspect for damage. Repair or install new as required.  Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body</u></b>



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		<b><u>Assembly.</u></b> Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy.</u></b>
<b>Intermediate Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Pump Assembly</b>	Worn/cross leaks	Inspect for damage. Install new as required.
	Component damaged	Inspect for damage, missing ball. Install a new pump assembly if required.

### SHIFT CONCERNS: HARSH 2-3 SHIFT (AUTOMATIC)

Possible Component	Reference/Action
<b>241 - ELECTRICAL ROUTINE</b>	
<b>Solenoid Body</b>	
Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy.</u></b>
<b>341 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Incorrect Pressures</b>	
Line pressure	Check pressure at

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		line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specifications. If not OK, check Main Control Valve Body.
<b>Main Control Valve Body</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled Multiplex Valve, Springs, Clips - loose, stuck, missing, binding misassembled Shift Solenoid B (SSB) or Shift Solenoid C (SSC) not functioning correctly	Tighten bolts to specification. Inspect for damage. Install new as required.  Inspect for damage. Repair or install new as required.  Inspect for damage. Repair or install new as required.  Inspect for damage. Repair or install new as required.  Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body</u></b>

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		<u>Strategy.</u>
<b>Direct Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Intermediate Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: HARSH 3-4 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
<b>242 - ELECTRICAL ROUTINE</b>	
<b>Solenoid Body</b>	
	Incorrect solenoid body strategy data stored in the PCM  Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy.</u></b>

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### 342 - HYDRAULIC/MECHANICAL ROUTINE

#### Main Control Valve Body

Bolts out of torque specification	Tighten bolts to specification.
Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
Overdrive Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled	Inspect for damage. Repair or install new as required.
Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled	Inspect for damage. Repair or install new as required.
Shift Solenoid D (SSD) or Shift Solenoid B (SSB) not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .

#### Overdrive Clutch Assembly

Seals - damaged	Inspect for damage. Install new as required.
Piston - damaged	Inspect for damage. Install new as required.
Friction - damaged, worn	Inspect for damage. Install new as required.
Cylinder Hub - damaged	Inspect for damage. Install new as

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	Return Spring Assembly - damaged	required. Inspect for damage. Install new as required.
<b>Direct Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: HARSH 4-5 SHIFT (AUTOMATIC)**

<b>Possible Component</b>		<b>Reference/Action</b>
<b>243 - ELECTRICAL ROUTINE</b>		
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>343 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Main Control Valve Body</b>	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing,	Inspect for damage. Repair or install new as required.

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	misassembled Forward Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled Shift Solenoid B (SSB) or Shift Solenoid A (SSA) not functioning correctly	Inspect for damage. Repair or install new as required.  Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Direct Clutch Assembly</b>	Seals - damaged  Piston - damaged  Friction - damaged, worn  Cylinder Hub - damaged  Return Spring Assembly - damaged	Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required.
<b>Forward Clutch Assembly</b>	Seals - damaged  Piston - damaged  Friction - damaged, worn	Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as

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Cylinder Hub - damaged	required. Inspect for damage. Install new as required.
Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: HARSH 5-6 SHIFT (AUTOMATIC)**

Possible Component		Reference/Action
<b>244 - ELECTRICAL ROUTINE</b>		
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>344 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Main Control Valve Body</b>	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled	Inspect for damage. Repair or install new as required.
	Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled	Inspect for damage. Repair or install new as required.
	Shift Solenoid C (SSC) or Shift Solenoid B (SSB) not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> .

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		Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Intermediate Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Direct Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

### SHIFT CONCERNS: HARSH 6-5 SHIFT (AUTOMATIC)

Possible Component	Reference/Action
<b>245 - ELECTRICAL ROUTINE</b>	
<b>Solenoid Body</b>	



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Incorrect solenoid body strategy data stored in the PCM

Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to **Solenoid Body Strategy**.

### 346 - HYDRAULIC/MECHANICAL ROUTINE

#### Main Control Valve Body

Bolts out of torque specification  
Gaskets and Separator Plate - damaged, off location  
Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled  
Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled  
Shift Solenoid C (SSC) or Shift Solenoid B (SSB) not functioning correctly

Tighten bolts to specification.  
Inspect for damage. Install new as required.  
Inspect for damage. Repair or install new as required.  
Inspect for damage. Repair or install new as required.  
Activate solenoid using scan tool. Refer to **Output State Control (OSC) Mode**. Go to **Pinpoint Test A**. Install a new solenoid body. Refer to **Solenoid Body Assembly**. Download a new solenoid body strategy into the PCM. Refer to **Solenoid Body Strategy**.

#### Intermediate Clutch Assembly

Seals - damaged

Inspect for damage. Install new as required.

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	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Direct Clutch Assembly</b>		
	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: HARSH 5-4 SHIFT (AUTOMATIC)**

Possible Component		Reference/Action
<b>246 - ELECTRICAL ROUTINE</b>		
<b>Solenoid Body</b>		
	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>346 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Main Control Valve Body</b>		
	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and	Inspect for damage.

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	Separator Plate - damaged, off location Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed on Forward Regulator and Boost Valves, Springs, Clips - loose, stuck, missing, misassembled, clutch failed off Shift Solenoid A (SSA) not functioning correctly, Shift Solenoid B (SSB) stuck on	Install new as required. Inspect for damage. Repair or install new as required. Inspect for damage. Repair or install new as required. Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Direct Clutch Assembly</b>	Seals - damaged Piston - damaged Friction - damaged, worn Cylinder Hub - damaged Return Spring Assembly - damaged	Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required. Inspect for damage. Install new as required.
<b>Forward Clutch Assembly</b>		

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	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.

**SHIFT CONCERNS: HARSH 4-3 SHIFT (AUTOMATIC)**

Possible Component		Reference/Action
<b>247 - ELECTRICAL ROUTINE</b>		
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>347 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Main Control Valve Body</b>	Bolts out of torque specification	Tighten bolts to specification.
	Gaskets and Separator Plate - damaged, off location	Inspect for damage. Install new as required.
	Overdrive Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled	Inspect for damage. Repair or install new as required.
	Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding,	Inspect for damage. Repair or install new as required.

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	missing, misassembled, clutch failed off Shift Solenoid B (SSB) or Shift Solenoid D (SSD) not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Overdrive Clutch Assembly</b>	<p>Seals - damaged</p> <p>Piston - damaged</p> <p>Friction - damaged, worn</p> <p>Cylinder Hub - damaged</p> <p>Return Spring Assembly - damaged</p>	<p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p>
<b>Direct Clutch Assembly</b>	<p>Seals - damaged</p> <p>Piston - damaged</p> <p>Friction - damaged, worn</p> <p>Cylinder Hub - damaged</p>	<p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p> <p>Inspect for damage. Install new as required.</p>

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Return Spring Assembly - damaged	Inspect for damage. Install new as required.
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**SHIFT CONCERNS: HARSH 3-2 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
<b>248 - ELECTRICAL ROUTINE</b>	
<b>Solenoid Body</b>	
Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>348 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Incorrect Pressures</b>	
Line pressure	Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specifications. If not OK, check Main Control Valve Body.
<b>Main Control Valve Body</b>	
Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Direct Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing, misassembled Intermediate Regulator and Boost Valves, Springs, Clips - loose, stuck, binding, missing,	Tighten bolts to specification. Inspect for damage. Install new as required.  Inspect for damage. Repair or install new as required.  Inspect for damage. Repair or install new as required.

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	misassembled Shift Solenoid B (SSB) or Shift Solenoid C (SSC) not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Direct Clutch Assembly</b>	Seals - damaged  Piston - damaged  Friction - damaged, worn  Cylinder Hub - damaged  Return Spring Assembly - damaged	Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.
<b>Intermediate Clutch Assembly</b>	Seals - damaged  Piston - damaged  Friction - damaged, worn  Cylinder Hub - damaged  Return Spring	Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage. Install new as required.  Inspect for damage.

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Assembly - damaged	Install new as required.
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**SHIFT CONCERNS: HARSH 2-1 SHIFT (AUTOMATIC)**

Possible Component	Reference/Action
<b>249 - ELECTRICAL ROUTINE</b>	
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>349 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Incorrect Pressures</b>	Line pressure Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specifications. If not OK, check Main Control Valve Body.
<b>Main Control Valve Body</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location Intermediate Regulator Valve, Springs, Clips - loose, stuck, binding, missing, misassembled Shift Solenoid C (SSC) not functioning correctly Tighten bolts to specification. Inspect for damage. Install new as required. Inspect for damage. Repair or install new as required. Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> .



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		Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Intermediate Clutch Assembly</b>	Seals - damaged	Inspect for damage. Install new as required.
	Piston - damaged	Inspect for damage. Install new as required.
	Friction - damaged, worn	Inspect for damage. Install new as required.
	Cylinder Hub - damaged	Inspect for damage. Install new as required.
	Return Spring Assembly - damaged	Inspect for damage. Install new as required.
<b>Low One-Way Clutch Assembly</b>	Damaged - not holding	Inspect for damage. Install new as required.
<b>Planetary Carrier</b>	Damaged	Inspect for damage. Install new as required.

**TORQUE CONVERTER OPERATION CONCERNS: NO APPLY**

<b>Possible Component</b>		<b>Reference/Action</b>
<b>250 - ELECTRICAL ROUTINE</b>		
<b>Powertrain Control System</b>		
	Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Torque Converter Clutch (TCC) Solenoid, Throttle Position (TP) sensor,	Carry out Torque Converter Operation Test. Refer to <b><u>Torque Converter Diagnosis</u></b> . Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction -</u></b>

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Transmission Fluid Temperature (TFT) sensor, Turbine Shaft Speed (TSS) sensor, Output Shaft Speed (OSS) sensor and shorted shift solenoid

**Gasoline Engines** article for diagnosis. Go to **Pinpoint Test A**, go to **Pinpoint Test B** and Go to **Pinpoint Test C**.

### 350 - HYDRAULIC/MECHANICAL ROUTINE

#### Incorrect Pressures

Line pressure

Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to **Special Testing Procedures**. See the Line Pressure Chart for specifications. If not OK, check Main Control Valve Body.

#### Main Control Valve Body

Bolts out of torque specification  
Gaskets and Separator Plate - damaged, off location  
TCC Regulator Valve, Springs, Clips - loose, stuck, missing, misassembled  
TCC Control Valve, Springs, Clips - loose, stuck, missing, misassembled  
TCC Solenoid - not functioning correctly

Tighten bolts to specification.  
Inspect for damage. Install new as required.  
Inspect for damage. Repair or install new as required.  
Inspect for damage. Repair or install new as required.  
Activate solenoid using scan tool. Refer to **Output State Control (OSC) Mode**. Go to **Pinpoint Test A**. Install a new solenoid body. Refer to **Solenoid Body Assembly**. Download a new solenoid body strategy into the

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		PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>Turbine Shaft</b>	Seals - damaged, missing Holes - missing, plugged	Inspect for damage. Repair as required. Inspect for damage. Repair as required.
<b>Stator Support Assembly</b>	Seals - damaged, missing Holes - missing, plugged	Inspect for damage. Repair as required. Inspect for damage. Repair as required.
<b>Torque Converter Hub Bushing</b>	Torque converter hub bushing worn  TCC worn	Inspect the bushing for damage and install a new torque converter as required.  Install a new torque converter as required.

### TORQUE CONVERTER OPERATION CONCERN: ALWAYS APPLIED/STALLS VEHICLE

Possible Component	Reference/Action
<b>251 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Torque Converter Clutch (TCC) Solenoid  Carry out Torque Converter Operation Test. Refer to <b><u>Torque Converter Diagnosis</u></b> . Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> using the scan tool. Repair as required. Clear codes. Road Test and rerun On-Board Diagnostic (OBD).
<b>351 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>Main Controls</b>	Bolts out of torque specification  Tighten bolts to specification.

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Gaskets and Separator Plate - damaged, off location	Inspect gaskets. Repair as required.
TCC Regulator Valve, Springs, Clips - loose, stuck, binding, missing, misassembled	Inspect for damage. Repair or install new as required.
TCC Control Valve, Springs, Clips - loose, stuck, binding, missing, misassembled	Inspect for damage. Repair or install new as required.
TCC Solenoid - not functioning correctly	Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode</u></b> . Go to <b><u>Pinpoint Test A</u></b> . Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly</u></b> . Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy</u></b> .

### TORQUE CONVERTER OPERATION CONCERN: CYCLING/SHUDDER/CHATTER

Possible Component	Reference/Action
<b>252 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Torque Converter Clutch (TCC) Solenoid	Carry out Torque Converter Operation Test. Refer to <b><u>Torque Converter Diagnosis</u></b> . Run On-Board Diagnostic (OBD). Refer to <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test A</u></b> using the scan tool. Repair as required.

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		Clear codes. Road Test and rerun On-Board Diagnostic (OBD).
<b>Solenoid Body</b>	Incorrect solenoid body strategy data stored in the PCM	Verify solenoid body strategy data stored in the PCM, download new identification and strategy as necessary. Refer to <b><u>Solenoid Body Strategy</u></b> .
<b>352 - HYDRAULIC/MECHANICAL ROUTINE</b>		
	Transmission fluid condition	Prior to carrying out this action, make sure all electrical diagnostics have been carried out. Inspect transmission fluid condition. If burnt, drain transmission fluid and converter. Install new transmission fluid and transmission fluid filter assembly. Bring vehicle to normal operating temperature. Carry out Transaxle Drive Cycle Test. Carry out On-Board Diagnostic (OBD). If condition still exists, continue diagnostics.
<b>Incorrect Pressures</b>	Line pressure	Check pressure at line pressure tap. Carry out Line Pressure Test. Refer to <b><u>Special Testing Procedures</u></b> . See the Line Pressure Chart for specifications. If not OK, check Main Control. Refer to

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		<u><b>Main Control.</b></u>
<b>Main Controls</b>	Bolts out of torque specification Gaskets and Separator Plate - damaged, off location TCC Regulator Valve, Springs, Clips - loose, stuck, binding, missing, misassembled TCC Control Valve, Springs, Clips - loose, stuck, binding, missing, misassembled TCC Solenoid - not functioning correctly	Tighten bolts to specification. Inspect gaskets for damage. Repair as required. Inspect for damage. Repair or install new as required. Inspect for damage. Repair or install new as required. Activate solenoid using scan tool. Refer to <b><u>Output State Control (OSC) Mode.</u></b> Go to <b><u>Pinpoint Test A.</u></b> Install a new solenoid body. Refer to <b><u>Solenoid Body Assembly.</u></b> Download a new solenoid body strategy into the PCM. Refer to <b><u>Solenoid Body Strategy.</u></b>
<b>Turbine Shaft</b>	Seals - damaged, missing	Inspect for damage. Install new as required.
<b>Torque Converter</b>	Torque converter damaged	Refer to <b><u>Torque Converter.</u></b>
<b>Stator Support Assembly</b>	Stator support assembly - worn, damaged Stator support seals - worn, damaged,	Inspect for damage. Install new as required. Inspect for damage. Install new as

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leaking

required.

**OTHER CONCERNS: SELECTOR LEVER EFFORTS HIGH**

Possible Component		Reference/Action
<b>261 - ELECTRICAL ROUTINE</b>		
	No electrical concerns	
<b>361 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Selector Lever Linkage (Internal, External)</b>		
	Damaged or out of adjustment	Inspect for damage. Repair as required. Verify selector lever adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>Manual Control Lever</b>		
	External Retaining Pin - damaged, Nut - loose, Detent Spring - bent, damaged; or Park Mechanism - damaged, incorrect lever used	Inspect for damage. Repair or install new as required.
<b>Main Control Valve Body</b>		
	Manual Valve - stuck Bolts out of torque specification	Inspect for damage. Repair or install new as required. Tighten bolts to specification.
<b>Brake Shift Interlock</b>		
	Mechanically damaged  Transmission Range (TR) sensor indicating park	Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article. Go to <b><u>Pinpoint Test D.</u></b>

**OTHER CONCERNS: EXTERNAL LEAKS**

Possible Component		Reference/Action
<b>262 - ELECTRICAL ROUTINE</b>		
	No electrical concerns	
<b>362 - HYDRAULIC/MECHANICAL ROUTINE</b>		

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**Transmission Fluid Level**

High transmission fluid level

Check transmission fluid level and adjust as necessary. Refer to **Preliminary Inspection.**

Transmission fluid condition

Carry out transmission fluid condition check. Refer to **Preliminary Inspection.****Seals, Gaskets**

Leaks: Converter, Turbine Shaft Speed (TSS) Sensor, Halfshaft Axles, Gasket/Seal Manual Lever, Fluid Level Indicator, Main Control Cover, Incorrect Hub Seal

Locate source of leak. Repair as required.

**Other**Leaks: Cooler Fitting, Pressure Taps, Transaxle Connector, Transaxle Pan, Cooler Tubes, Case Porosity, Case Cracked  
Vent - blocked damaged

Locate source of leak. Repair as required.

Check vent for damage or blockage. Repair as required.

**OTHER CONCERNS: POOR VEHICLE PERFORMANCE**

Possible Component	Reference/Action
<b>263 - ELECTRICAL ROUTINE</b>	
<b>Powertrain Control System</b>	
Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Torque Converter Clutch (TCC) Solenoid, Throttle Position (TP) sensor, Output Shaft Speed	Run On-Board Diagnostic (OBD). Refer to the <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis. Go to <b><u>Pinpoint Test C</u></b> using scan tool. Repair as required.



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	(OSS) sensor, Mass Air Flow (MAF) sensor, Intake Air Temperature (IAT) Sensor, Internal Wiring Harness	Clear codes. Road test and rerun On-Board Diagnostic (OBD).  Carry out Shift Point Road Test. Refer to <b><u>Shift Point Road Test</u></b> and carry out Torque Converter Operation Test. Refer to <b><u>Torque Converter Diagnosis</u></b> .
<b>363 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Transmission Fluid</b>	Low transmission fluid level	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Verify Correct Shift Scheduling, Engagements, Line Pressures and Stall Speed</b>		Go to the appropriate Diagnostic Routines per Index.
<b>Converter Clutch Always Applied</b>		Go to Routine 351.

**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 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>264 - ELECTRICAL ROUTINE</b>	
No electrical concerns	
<b>364 - HYDRAULIC/MECHANICAL ROUTINE</b>	
<b>For Noises/Vibrations That Change With Engine Speed</b>	

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	Converter components  Engine Drive Accessories Transmission Fluid Cooler Tubes grounding out Flexplate	Locate source of disturbance. Repair as required. Transmission fluid level (low) - pump cavitation. Pump assembly.
<b>For Noises/Vibrations That Change With Vehicle Speed</b>	Engine Mounts - loose or damaged  Driveline concerns: <ul style="list-style-type: none"><li>○ Halfshaft shudder</li><li>○ CV joints</li><li>○ Suspension</li><li>○ Modifications</li></ul> Output/Halfshaft Splines - worn or damaged Turbine Shaft Speed (TSS) sensor - incorrectly installed	Locate source of disturbance and repair as required.       Inspect for damage. Repair as required.
<b>Other Noises/Vibrations</b>	Main Controls - Valve resonance  Selector Lever Cable - vibration, grounding  Transmission Fluid Cooler Tubes - grounding ABS  Power Steering Pump	Locate source of disturbance and repair as required. Locate source of disturbance and repair as required. Locate source of disturbance and repair as required. Refer to <b><u>VEHICLE DYNAMIC SYSTEMS</u></b> article. Refer to <b><u>POWER STEERING</u></b> article.

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**OTHER CONCERNS: ENGINE WILL NOT CRANK**

Possible Component		Reference/Action
<b>265 - ELECTRICAL ROUTINE</b>		
<b>Powertrain Control System</b>		
	Electrical Inputs/Outputs, Vehicle Wiring Harnesses, PCM, Transmission Range (TR) Sensor	Carry out Torque Converter Operation Test. Refer to <b><u>Torque Converter Diagnosis</u></b> . Run On-Board Diagnostic (OBD). Refer to the <b><u>Introduction - Gasoline Engines</u></b> article for diagnosis.
<b>365 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Selector Lever Linkage (Internal, External)</b>		
	Damaged or out of adjustment	Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.

**OTHER CONCERNS: NO PARK RANGE**

Possible Component		Reference/Action
<b>266 - ELECTRICAL ROUTINE</b>		
	No electrical concerns	
<b>366 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Selector Lever Linkage (Internal/External)</b>		
	Damaged or out of adjustment	Inspect for damage. Repair as required. Verify selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> article.
<b>Park Mechanism</b>		
	Park Brake Pawl, Parking Pawl Return Spring, Park Rod Abutment, Parking Pawl Shaft, Parking Pawl Actuating Rod, Manual Control Lever, Manual Lever Detent	Inspect for damage. Repair as required.

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Spring - damaged

**OTHER CONCERNS: TRANSAXLE OVERHEATING**

Possible Component		Reference/Action
<b>267 - ELECTRICAL ROUTINE</b>		
	No electrical concerns	
<b>367 - HYDRAULIC/MECHANICAL ROUTINE</b>		
<b>Transmission Fluid</b>	Incorrect transmission fluid level	Check transmission fluid level and adjust as necessary. Refer to <b><u>Preliminary Inspection.</u></b>
	Transmission fluid condition	Carry out transmission fluid condition check. Refer to <b><u>Preliminary Inspection.</u></b>
<b>Transmission Fluid Cooler Tubes</b>	Damaged, blocked, reversed, leaking	Inspect for damage. Repair as required.
<b>Auxiliary Cooler</b>	Damaged, blocked, restricted or incorrectly installed	Inspect for damage. Repair as required.
<b>Vehicle Concerns Causing Engine Overheating</b>		Refer to <b><u>ENGINE COOLING</u></b> article.
<b>Main Control Valve Body</b>	Torque Converter Regulator Valve/Spring - stuck, damaged	Inspect for damage. Repair as required.
	Torque Converter Control Valve/Spring - stuck, damaged	Inspect for damage. Repair as required.
<b>Torque Converter Not Applying</b>	Seized Converter One-Way Clutch (OWC)	See Routine 250/350. Inspect for damage. Repair as required.
<b>Excessive Towing Loads</b>		Check GVW.
<b>Idle or Driveability Concern</b>		Refer to the

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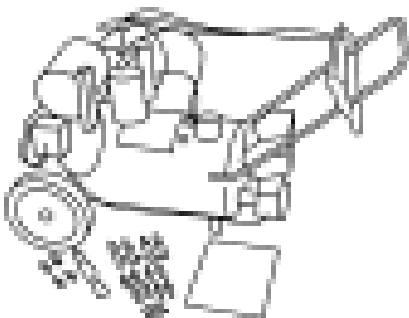
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		<b>Introduction - Gasoline Engines</b> article.
<b>Incorrect Clutch Application or Oil Pressure Control System</b>		Carry out line pressure tests. Refer to <b>Special Testing Procedures</b> and carry out shift point road test. Refer to <a href="#">Shift Point Road Test</a> . Repair as required. See the Line Pressure Chart, and Clutch Application Chart for specifications. Repair as required.

## GENERAL PROCEDURES

### TRANSMISSION FLUID COOLER BACKFLUSHING AND CLEANING

#### Special Tools

Illustration	Tool Name	Tool Number
 <b>ST2971-A</b>	Turbo-Tank Heated Cooler Line Flusher	222-00004

#### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

**NOTE:** Transmission fluid cooler backflushing will be carried out using the Turbo-Tank

**Heated Cooler Line Flusher. Follow the manufacturer's instructions included with the machine. Test the equipment to make sure that a vigorous fluid flow is present before proceeding.**

1. Check and top off fluid level of the Turbo-Tank Heated Cooler Line Flusher tank with transmission fluid.
2. Allow the fluid in the flusher 15-30 minutes to heat up to 60°C (140°F) before using.
3. Install the line adapters on the transmission fluid cooler tubes.

**NOTE: The FRONT transmission fluid cooler tube on the thermal bypass valve is the transmission fluid cooler pressure tube.**

4. Attach the flusher's red line to the transmission fluid cooler pressure tube quick disconnect fitting.
5. Attach the flusher's blue line to the transmission fluid cooler return tube quick disconnect fitting.
6. Follow the equipment instructions to purge the transmission fluid cooler tubes and transmission fluid cooler prior to starting the flushing procedure.
7. Allow the transmission fluid cooling system to backflush for 10-15 minutes, then flush the transmission fluid cooler in a normal flow direction for an additional 10-15 minutes.
8. Clean the transaxle mounted fluid cooler tubes and the thermal bypass valve by hand.

## TRANSMISSION FLUID DRAIN AND REFILL

### Material

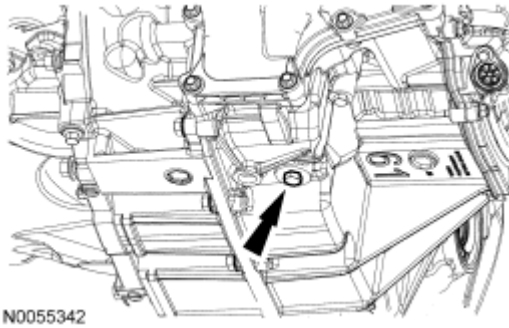
Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

**NOTE: In order to completely clean the torque converter, this procedure needs to be carried out 3 times.**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.

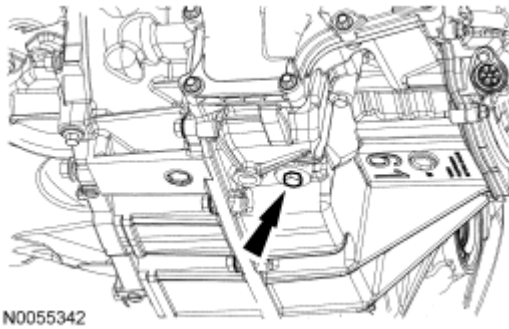
**NOTE: If an internal problem is suspected, drain the transmission fluid through a paper filter. A small amount of metal or friction particles may be found from normal wear. If an excessive amount of metal or friction material is present, the transaxle will need to be overhauled.**

2. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



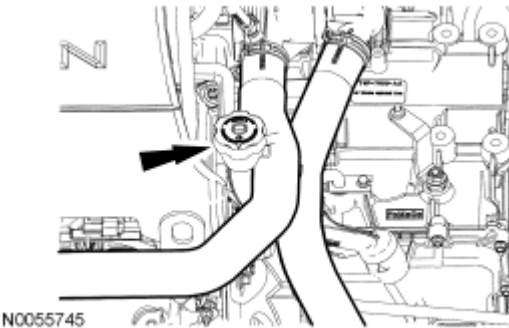
**Fig. 37: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

3. Install the transmission fluid drain plug.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 38: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

4. Fill the transaxle with clean transmission fluid.



**Fig. 39: Filling Transaxle With Clean Transmission Fluid**  
Courtesy of FORD MOTOR CO.

5. Start the engine and let it run for 3 minutes. Move the range selector lever into each gear position. Repeat Steps 2, 3, 4 and 5 two more times.

After the transmission fluid has been changed a total of 3 times, check the transmission fluid level for a

final time, making sure that the transmission fluid is at the correct level.

## TORQUE CONVERTER

1. A new or remanufactured torque converter must be installed if one or more of the following statements is true:
  - A torque converter malfunction has been determined based on complete diagnostic procedures.
  - Converter bolt holes, impeller hub or bushing are damaged.
  - Discoloration (due to overheating).
  - 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.
    - Internal torque converter contamination present. For additional information, refer to **Torque Converter Contamination Inspection**.

## TORQUE CONVERTER CONTAMINATION INSPECTION

### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

**NOTE:** Do not use water-based cleaners or mineral spirits to clean or flush the torque converter or transmission damage will occur. Use only clean automatic transmission fluid designated for the transmission and converter being serviced.

1. If a new or remanufactured torque converter is not being installed, the following steps must be completed.
2. With the torque converter on a bench, pour a small amount of transmission fluid from the torque converter onto an absorbent white tissue or through a paper filter and examine the transmission fluid.
3. Observe the color and odor of the fluid. The fluid should be red, not brown or black. Odor may indicate an overheating condition such as clutch disc or band failure.
4. Examine the stain on the tissue for evidence of particles of any kind. If particles are present in the transmission fluid, a new torque converter must be installed.
5. If there are no particles or contamination present, drain the remainder of the transmission fluid from the torque converter.
6. Add 1.9L (2 qt) of clean transmission fluid into the converter and agitate by hand.
7. Thoroughly drain the transmission fluid.

## IN-VEHICLE SERVICING



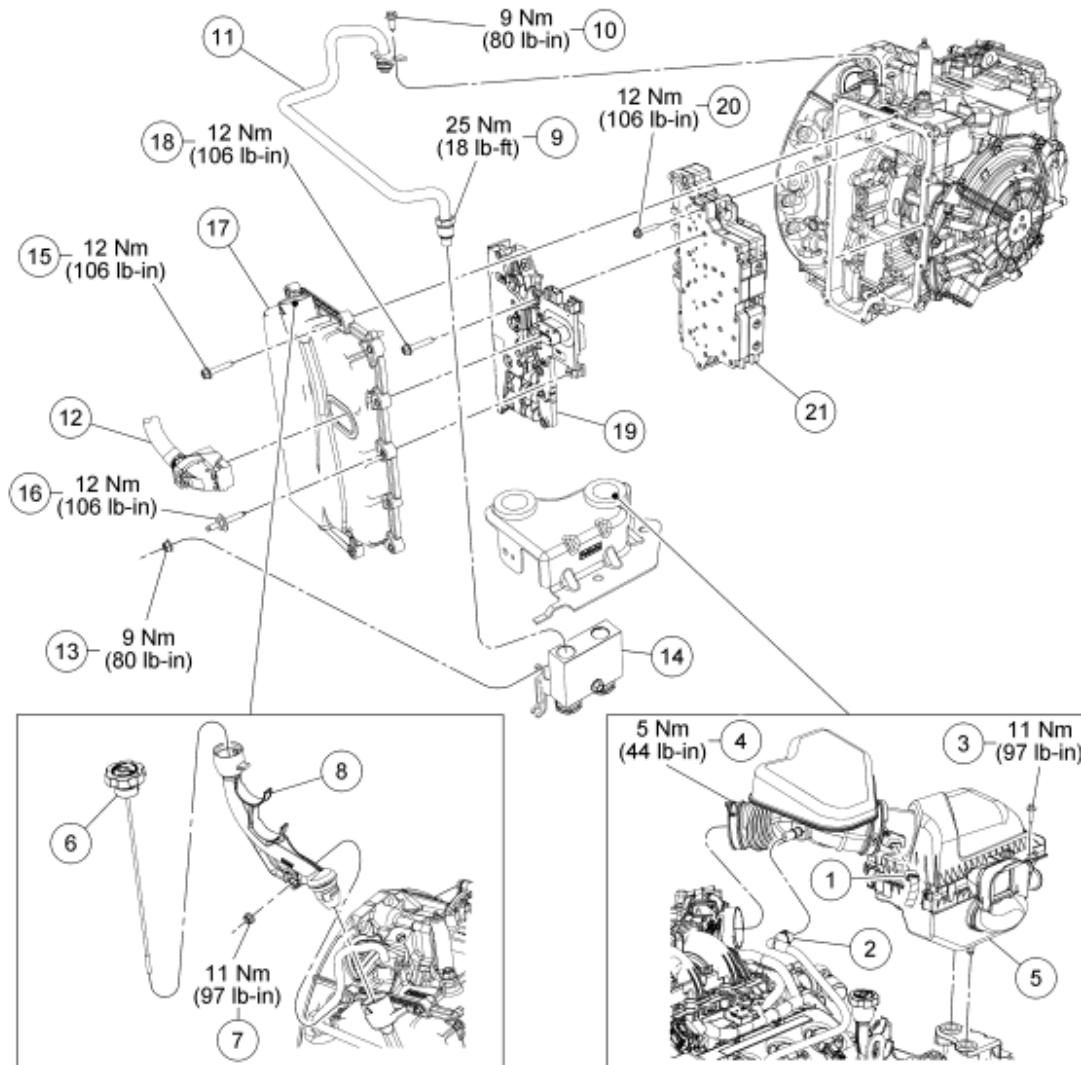
## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

### MAIN CONTROL

#### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V



N0091253

**Fig. 40: Main Control & Solenoid Body Components (With Torque Specifications)**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	14A464	Electrical connector - Mass Air Flow (MAF) sensor
2	6758	Tube assembly - crankcase vent

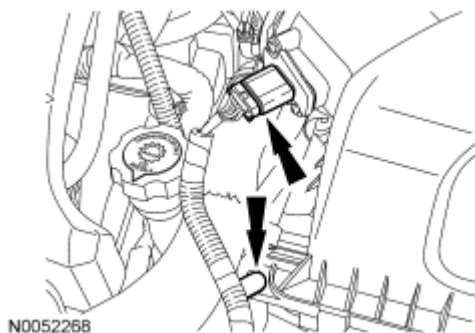
## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

3	N606678	Bolt - Air Cleaner (ACL) bracket
4	9C632	Clamp - ACL outlet pipe
5	9C662	ACL assembly
6	7A020	Transmission fluid level indicator
7	W520101	Transmission fluid filler tube nut
8	7A228	Transmission fluid filler tube
9	-	Nut - transmission fluid cooler tube (part of 7H420)
10	W711538	Bolt - transmission fluid cooler tube
11	7H420	Transmission fluid cooler tube
12	7A488	Connector - transaxle harness
13	W520101	Nut - bypass valve
14	7H322	Valve - transaxle fluid cooler bypass
15	7J289	Bolt - solenoid body cover (11 required)
16	W708442	Studbolt - solenoid body cover (3 required)
17	7G004	Cover - solenoid body
18	7J291	Bolt - solenoid body
19	7Z369	Solenoid body
20	7J291	Bolt - valve body
21	7A100	Valve body

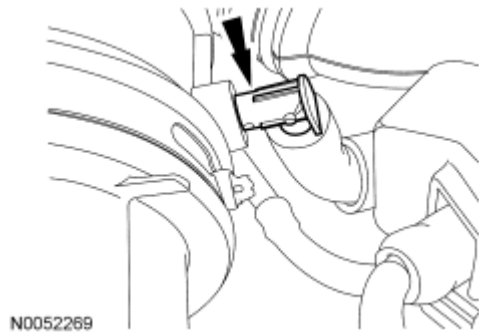
### REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.
2. Disconnect the Mass Air Flow (MAF) sensor electrical connector and the wiring harness fastener from the Air Cleaner (ACL) assembly.



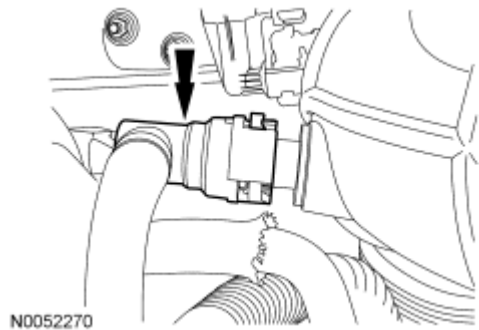
**Fig. 41: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

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



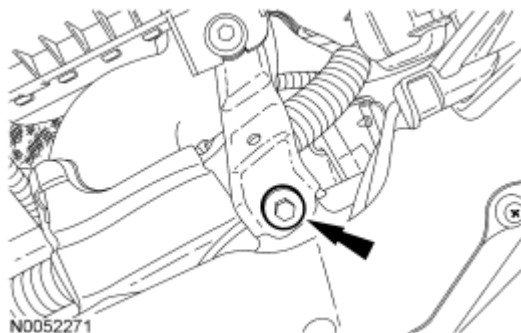
**Fig. 42: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

4. Disconnect the engine breather from the ACL assembly.



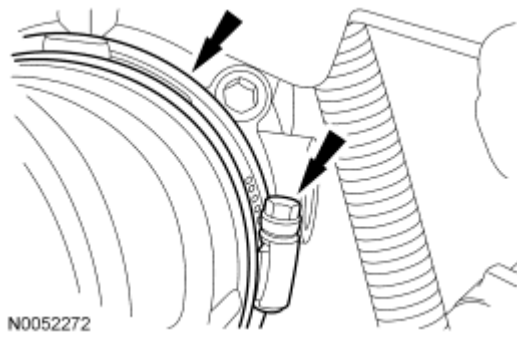
**Fig. 43: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

5. Remove the ACL assembly bracket bolt.



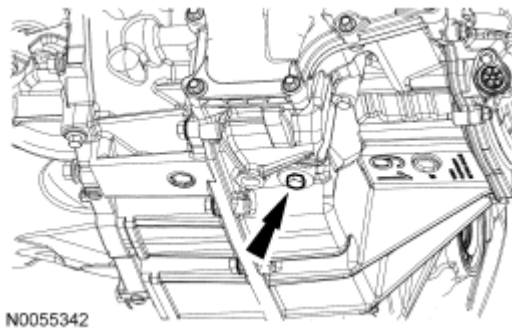
**Fig. 44: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

6. Loosen the ACL outlet pipe clamp at the Throttle Body (TB) and remove the ACL and ACL outlet pipe assembly.



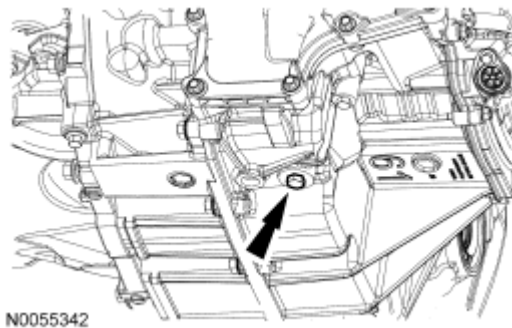
**Fig. 45: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

7. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



**Fig. 46: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

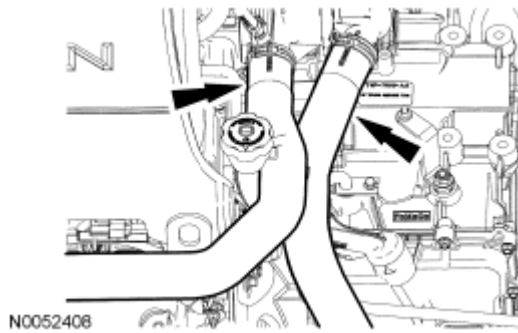
8. Install the transmission fluid drain plug.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 47: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses do not need to be removed from the engine.

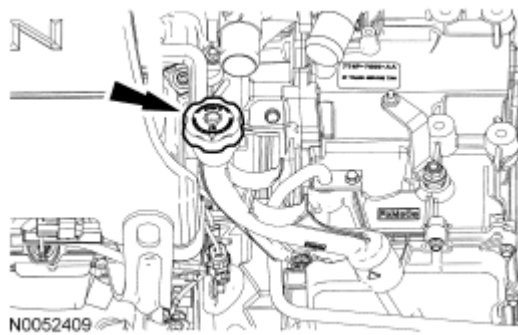
9. Remove the coolant hoses from the transmission fluid filler tube and position aside.



**Fig. 48: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

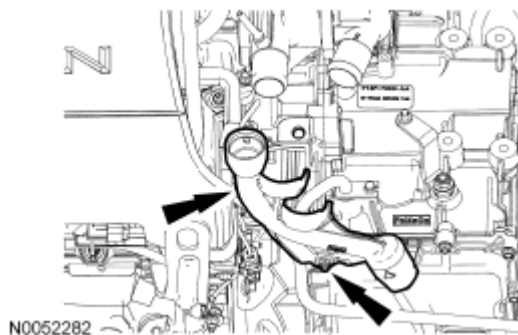
10. Remove the transmission fluid level indicator.



**Fig. 49: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

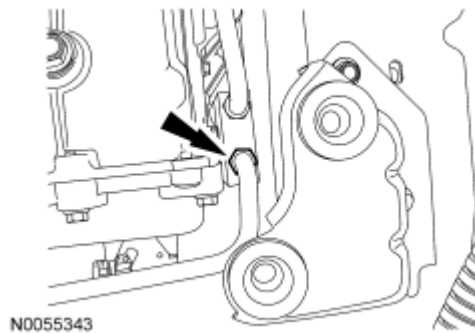
**NOTE:** The coolant hoses have been removed for clarity.

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



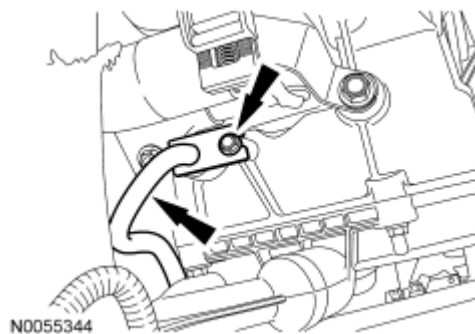
**Fig. 50: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

12. Loosen the transmission fluid cooler tube fitting from the thermal bypass valve.



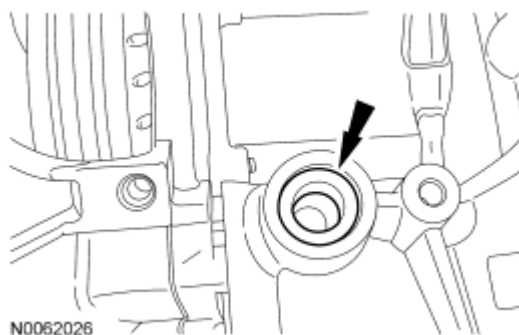
**Fig. 51: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

13. Remove and discard the transmission fluid cooler tube bolt and remove the transmission fluid cooler tube.



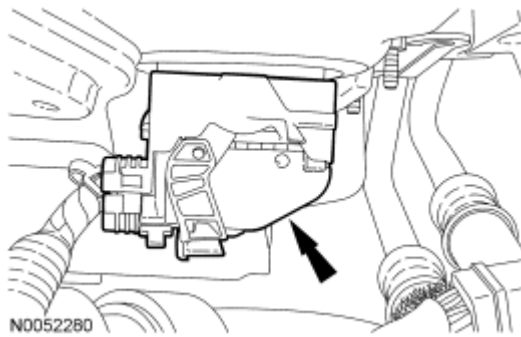
**Fig. 52: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

14. Inspect the transaxle case to make sure that the transmission fluid cooler tube seal and backing ring were removed with the transmission fluid cooler tube and are not stuck in the transaxle case. If the transmission fluid cooler tube seal or backing ring are stuck in the transaxle case, remove the seal and backing ring.



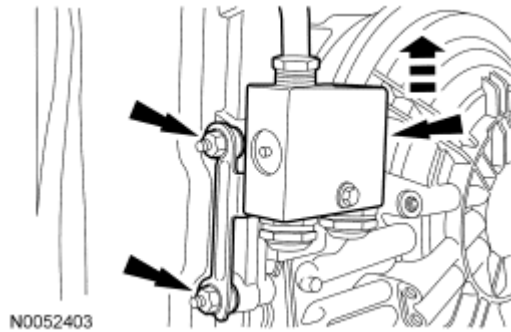
**Fig. 53: Identifying Transmission Fluid Cooler Tube Seal**  
Courtesy of FORD MOTOR CO.

15. Disconnect the transaxle electrical connector.



**Fig. 54: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

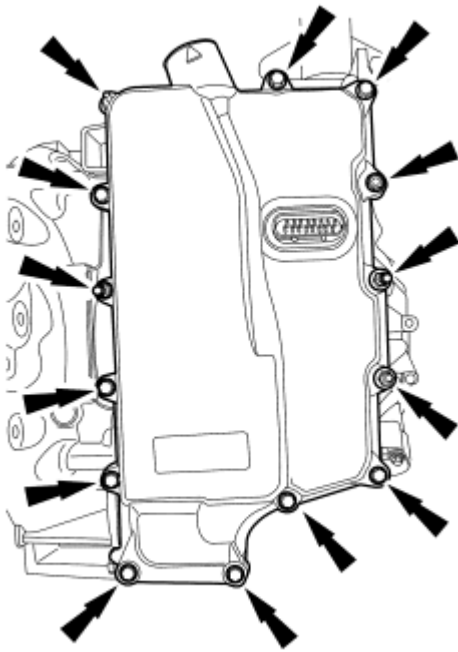
16. Remove the 2 nuts, pull the transmission fluid cooler thermal bypass valve straight up and position it aside.



**Fig. 55: Removing Nuts & Pulling Transmission Fluid Cooler Thermal Bypass Valve Straight Up**  
Courtesy of FORD MOTOR CO.

**NOTE:** Note the location of the studbolts for assembly.

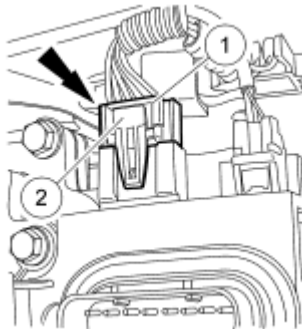
17. Remove the 14 bolts and the main control cover.



N0089296

**Fig. 56: Main Control Valve Cover Bolts**  
Courtesy of FORD MOTOR CO.

18. Disconnect the Transmission Range (TR) sensor electrical connector.
  1. Slide the lock over.
  2. Press the tab and disconnect the connector.

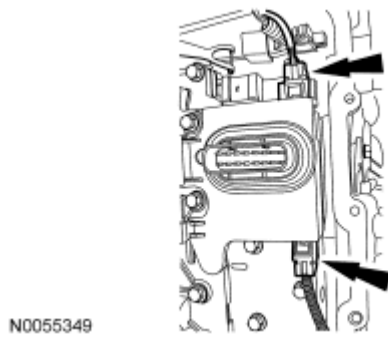


N0055348

**Fig. 57: Pressing Tab & Disconnecting Connector**  
Courtesy of FORD MOTOR CO.

19. Disconnect the Turbine Shaft Speed (TSS) and Output Shaft Speed (OSS) sensor electrical connectors.





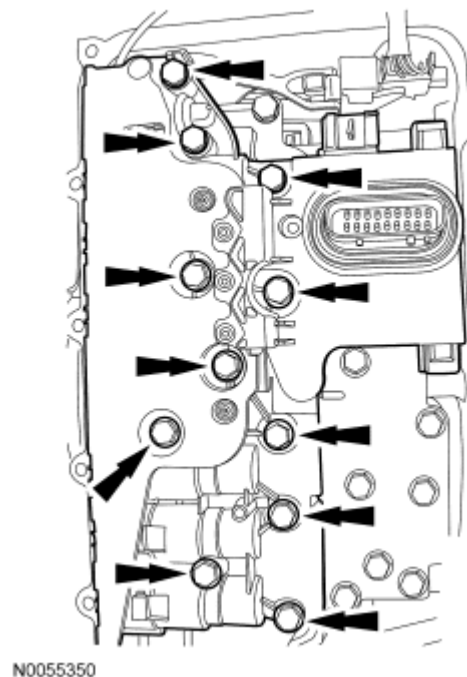
**Fig. 58: Locating Turbine Shaft Speed (TSS) & Output Shaft Speed (OSS) Sensor Electrical Connectors**

Courtesy of FORD MOTOR CO.

**NOTE:** The solenoid body should be handled with care, damage to the solenoid body may occur.

**NOTE:** Note the location of the different length bolts for assembly.

20. Remove the 11 bolts and the solenoid body.



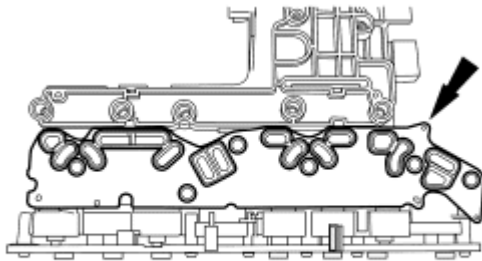
**Fig. 59: Locating Solenoid Body Bolts**

Courtesy of FORD MOTOR CO.

**NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.

**NOTE:** Use care not to break the alignment tabs when installing the solenoid body filter. Damage to the transaxle will occur if the solenoid body is not correctly aligned.

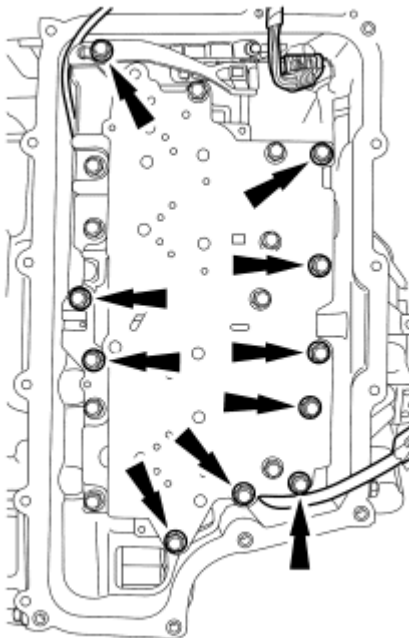
21. Remove the solenoid body filter assembly by pulling it straight up from the alignment tabs. Discard the filter.



N0055016

**Fig. 60: Identifying Solenoid Body Filter Assembly**  
Courtesy of FORD MOTOR CO.

22. Remove the 10 bolts, the TR sensor detent spring and the main control valve body.



N0057465

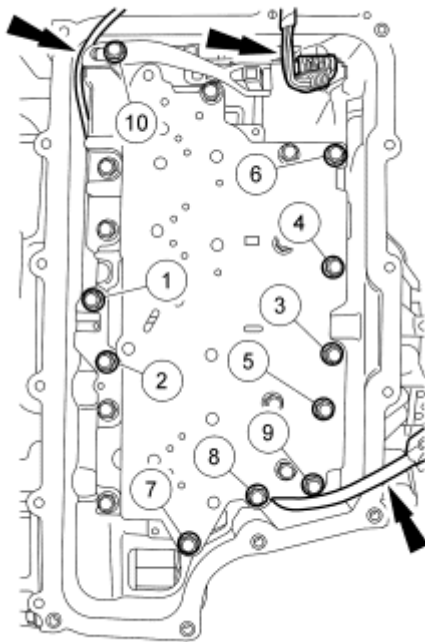
**Fig. 61: Locating Main Control Valve Body Bolts**  
Courtesy of FORD MOTOR CO.

## INSTALLATION

**NOTE:** If cleaning of the main control assembly or inspecting the valves, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - 6F50** article. If installing a new main control assembly continue with this procedure.

**NOTE:** Make sure that the manual control lever pin (part of the TR sensor) is correctly installed in the manual control valve.

1. Position the TSS, OSS and TR sensor wiring harnesses aside and install the main control valve body, the TR sensor detent spring and the 10 bolts. Tighten the bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).



N0057464

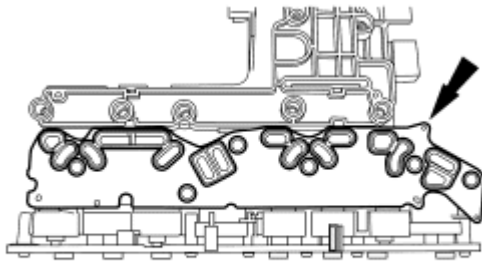
**Fig. 62: Main Control Valve Body Bolt Tightening Sequence**  
Courtesy of FORD MOTOR CO.

**NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.

**NOTE:** Use care not to break the alignment tabs when installing the solenoid body filter. Damage to the transaxle will occur if the solenoid body is not correctly aligned.

**NOTE:** Make sure that the filter passage areas are clean of foreign material before installing the filter. Damage to the transaxle will occur if the filter passages are not clean.

2. Install a new solenoid body filter assembly by pushing it straight down on to the alignment tabs.



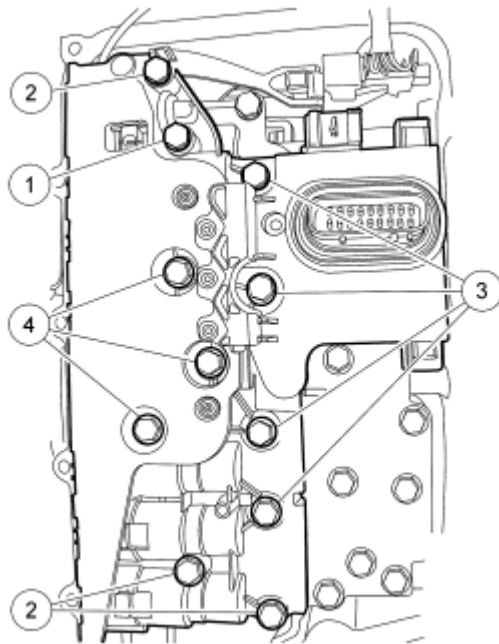
N0055016

**Fig. 63: Identifying Solenoid Body Filter Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure not to pinch the Turbine Shaft Speed (TSS), Output Shaft Speed (OSS) or Transmission Range (TR) sensor wiring harnesses when installing the solenoid body.

**NOTE:** Install the different length bolts in the locations noted during disassembly.

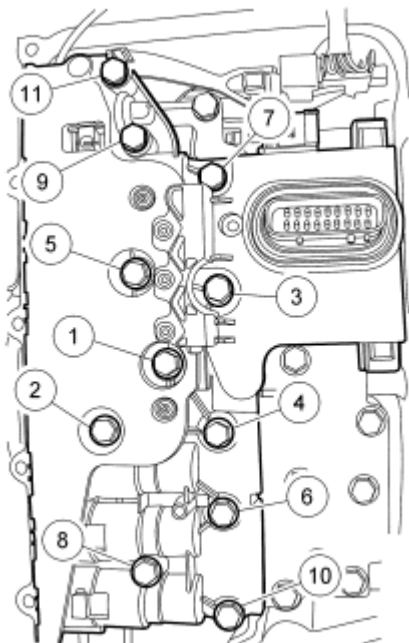
3. Install the solenoid body and the 11 bolts.
  1. 42 mm (1.65 in) bolt
  2. 63 mm (2.48 in) bolts
  3. 80 mm (3.14 in) bolts
  4. 95 mm (3.74 in) bolts



N0057462

**Fig. 64: Locating Solenoid Body Bolts**  
Courtesy of FORD MOTOR CO.

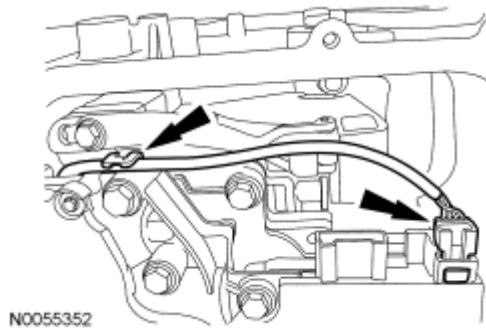
4. Tighten the solenoid body bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).



N0055351

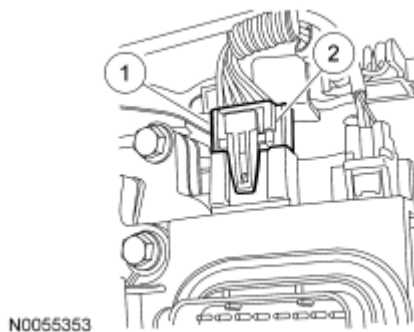
**Fig. 65: Tightening Solenoid Body Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

5. Route the OSS sensor wiring harness and connect the electrical connector.



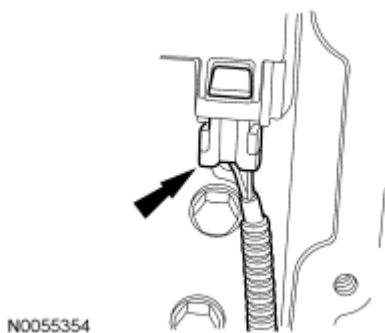
**Fig. 66: Locating OSS Sensor Wiring Harness & Electrical Connector**  
Courtesy of FORD MOTOR CO.

6. Connect the TR sensor electrical connector.
  1. Connect the electrical connector.
  2. Slide the locking tab over.



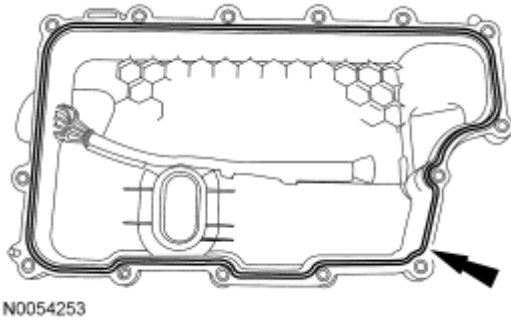
**Fig. 67: Identifying TR Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

7. Connect the TSS sensor electrical connector.



**Fig. 68: Identifying TSS Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

8. Inspect the transaxle main control cover seal for damage and install new if necessary.

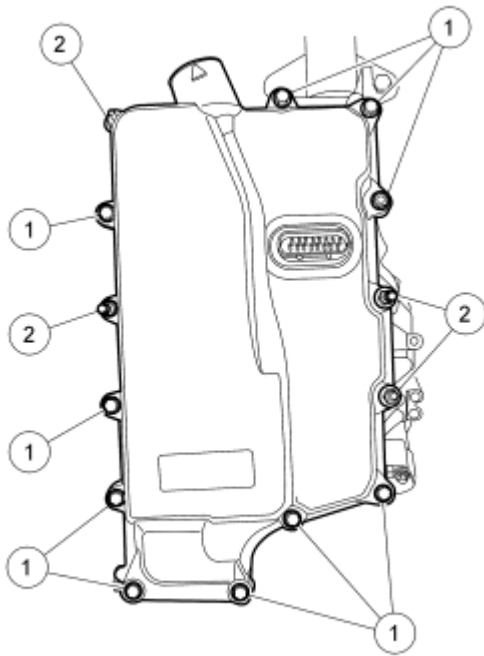


**Fig. 69: Inspecting Transaxle Main Control Cover Seal For Damage**  
Courtesy of FORD MOTOR CO.

**NOTE:** Inspect the 20-pin solenoid body connector seal to make sure that the seal is on the inside of the main control cover or a transmission fluid leak will occur.

**NOTE:** Install the studbolts in the locations noted during disassembly.

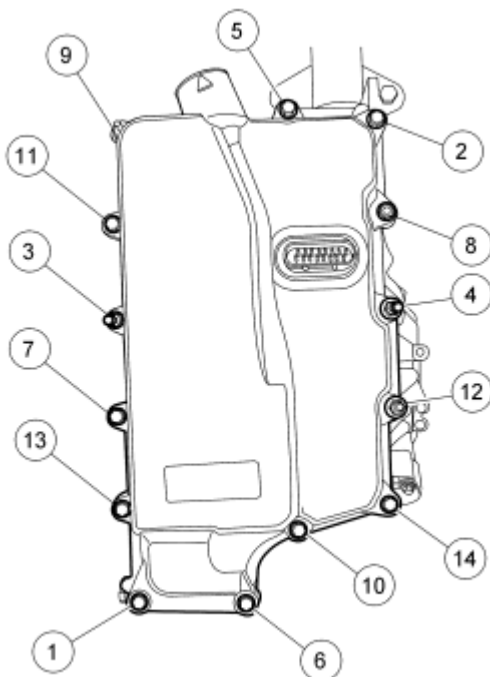
9. Install the main control cover and loosely install the 14 bolts.
  1. Bolt location
  2. Studbolt location



N0089295

**Fig. 70: Main Control Cover Bolts**  
Courtesy of FORD MOTOR CO.

10. Tighten the main control cover bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).

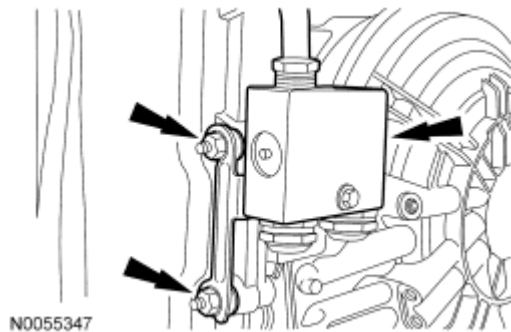


N0089294



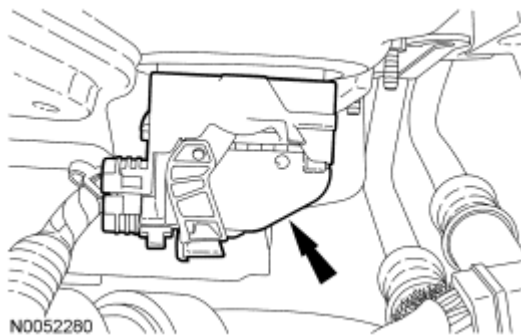
**Fig. 71: Main Control Cover Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

11. Position the transmission fluid cooler thermal bypass valve and transmission fluid cooler tube assembly in place and install the 2 transmission fluid cooler tube bracket nuts.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 72: Identifying Transmission Fluid Cooler Tube Assembly & Nuts**  
Courtesy of FORD MOTOR CO.

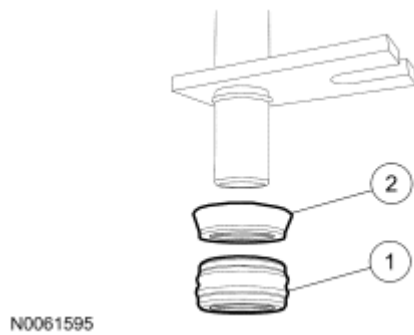
12. Connect the transaxle electrical connector.



**Fig. 73: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

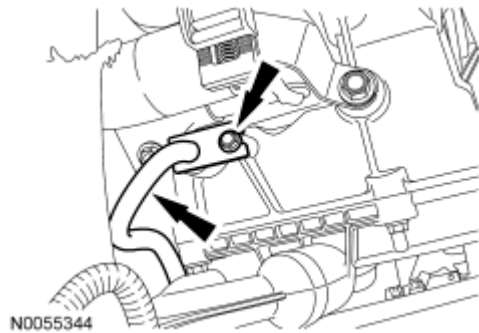
13. Inspect the transmission fluid cooler tube backing ring and seal for damage and install a new backing ring or seal if necessary. Lubricate the transmission fluid cooler tube seal with clean transmission fluid and install the backing ring and seal on the transmission fluid cooler tube.

Item	Part Number	Description
1	7D285	Seal
2	7J324	Backing ring



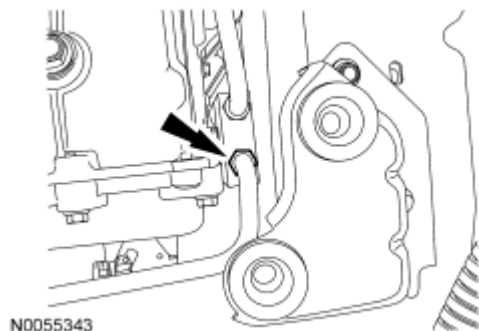
**Fig. 74: Identifying Transmission Fluid Cooler Tube Backing Ring & Seal**  
Courtesy of FORD MOTOR CO.

14. Position the transmission fluid cooler tube in place and install a new bolt.
  - Tighten to 9 Nm (80 lb-in).



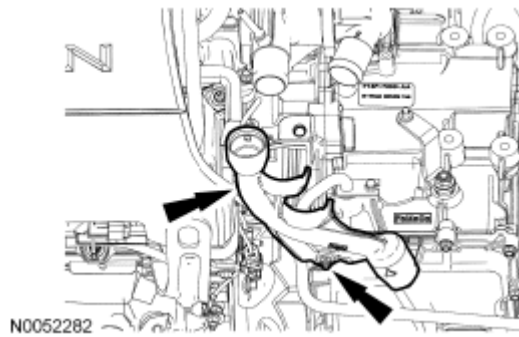
**Fig. 75: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

15. Tighten the transmission fluid cooler tube fitting.
  - Tighten to 25 Nm (18 lb-ft).



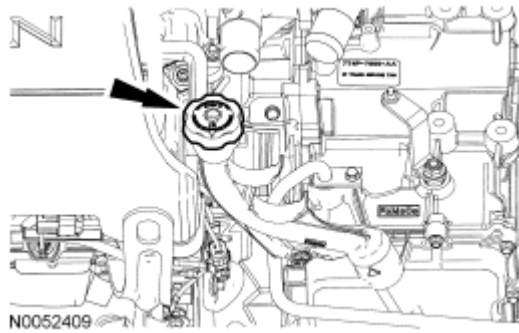
**Fig. 76: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

16. Install the fluid filler tube and the nut.
  - Tighten to 11 Nm (97 lb-in).



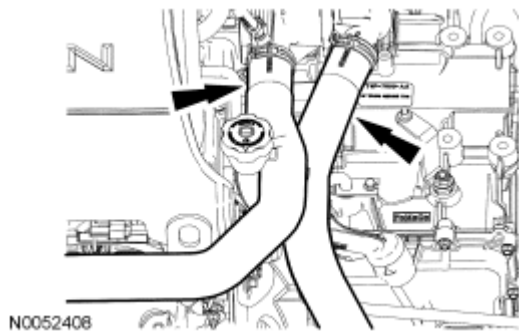
**Fig. 77: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

17. Install the transmission fluid level indicator.



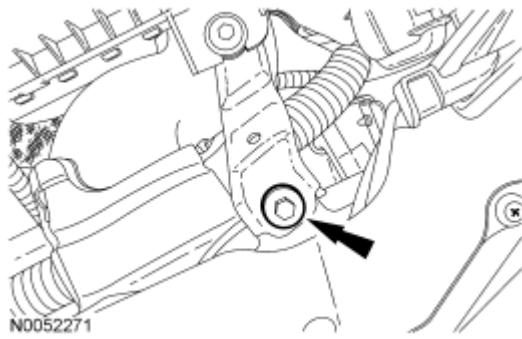
**Fig. 78: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

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



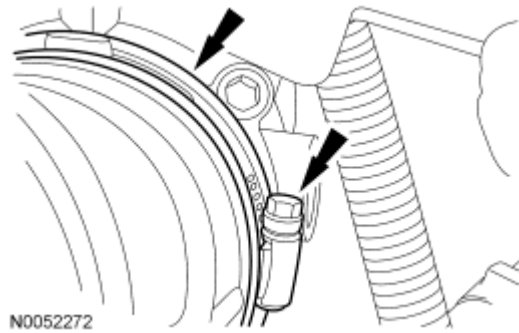
**Fig. 79: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

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



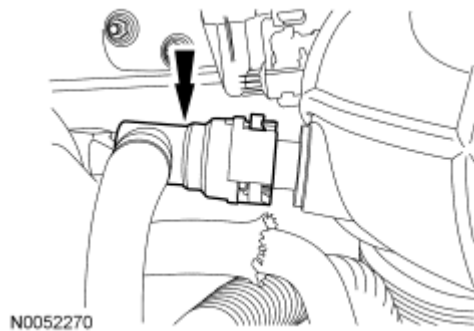
**Fig. 80: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

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



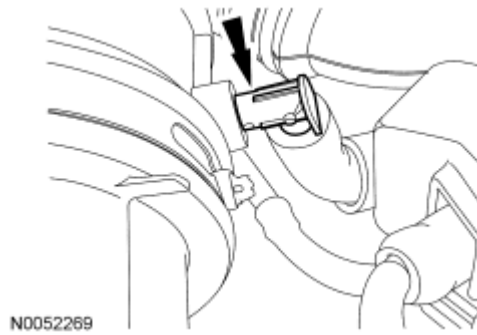
**Fig. 81: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

21. Connect the engine breather to the ACL assembly.



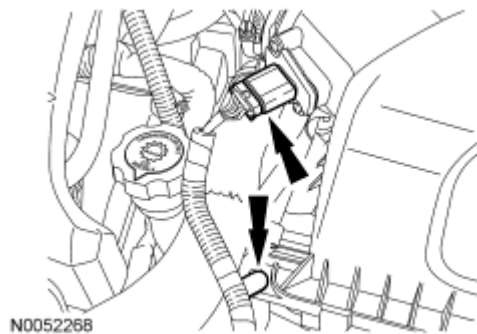
**Fig. 82: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

22. Connect the brake booster vacuum hose to the ACL assembly.



**Fig. 83: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

23. Connect the MAF sensor electrical connector and connect the electrical harness fastener.



**Fig. 84: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

24. Fill with clean transmission fluid to the correct level.

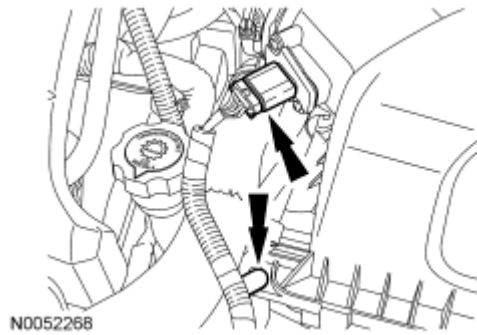
## TURBINE SHAFT SPEED (TSS) SENSOR

### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

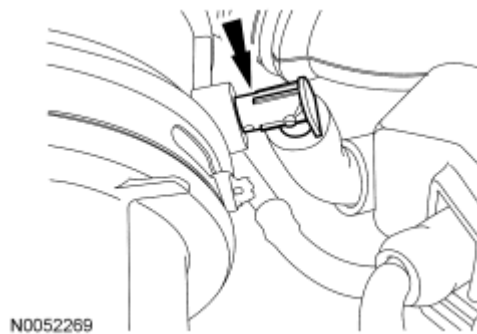
### REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.
2. Disconnect the Mass Air Flow (MAF) sensor electrical connector and the wiring harness fastener from the Air Cleaner (ACL) assembly.



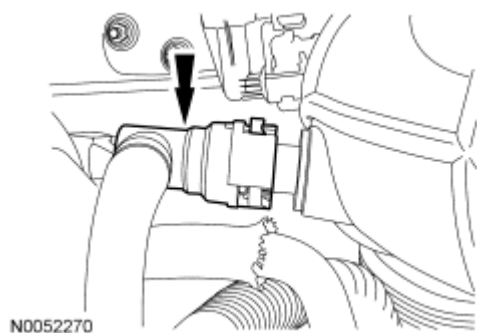
**Fig. 85: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

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



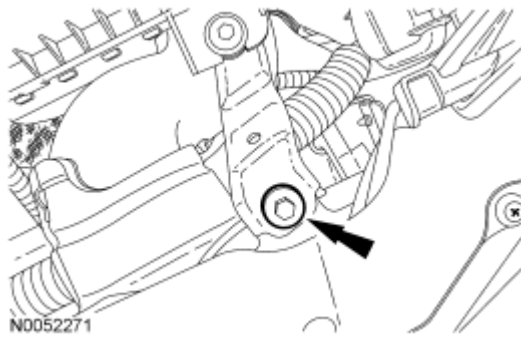
**Fig. 86: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

4. Disconnect the engine breather from the ACL assembly.



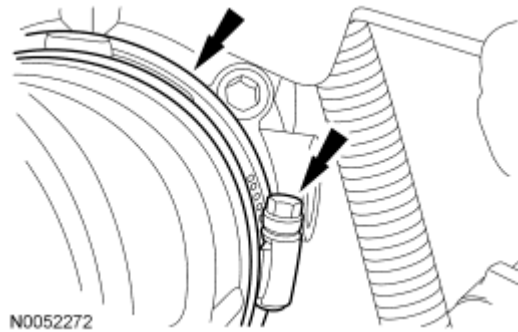
**Fig. 87: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

5. Remove the ACL assembly bracket bolt.



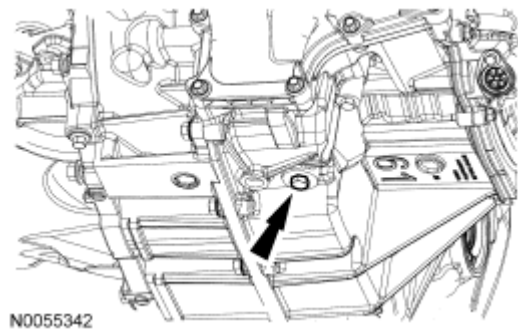
**Fig. 88: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

6. Loosen the ACL outlet pipe clamp at the Throttle Body (TB) and remove the ACL and ACL outlet pipe assembly.



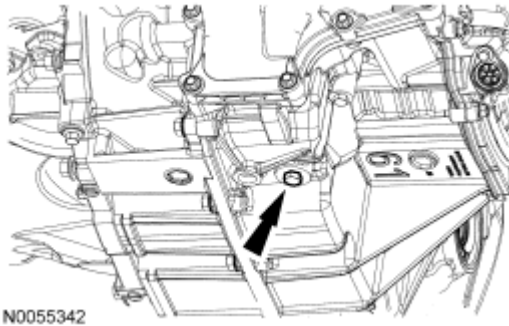
**Fig. 89: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

7. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



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

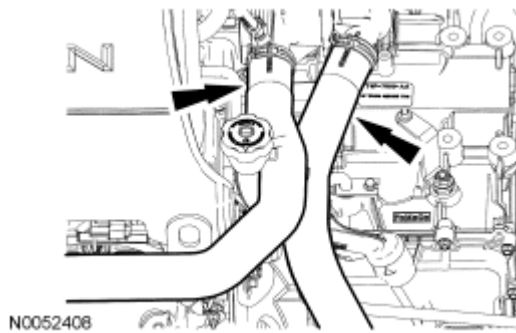
8. Install the transmission fluid drain plug.
  - Tighten to 9 Nm (80 lb-in).



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

**NOTE:** The coolant hoses do not need to be removed from the engine.

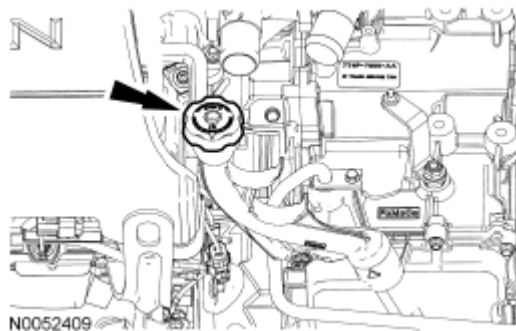
9. Remove the coolant hoses from the transmission fluid filler tube and position aside.



**Fig. 92: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

10. Remove the transmission fluid level indicator.

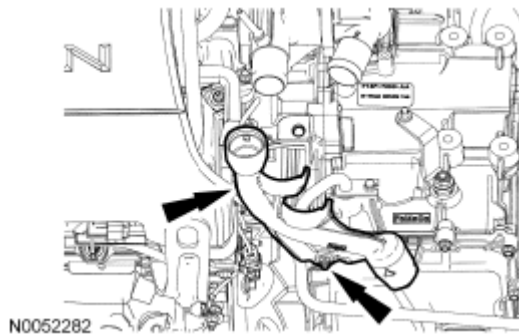


**Fig. 93: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.



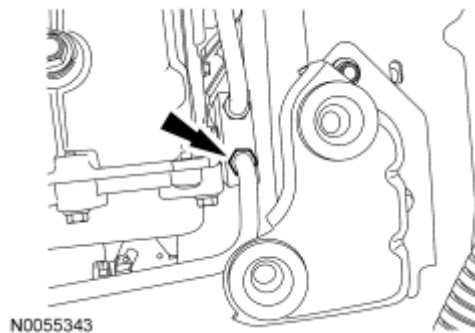
**NOTE:** The coolant hoses have been removed for clarity.

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



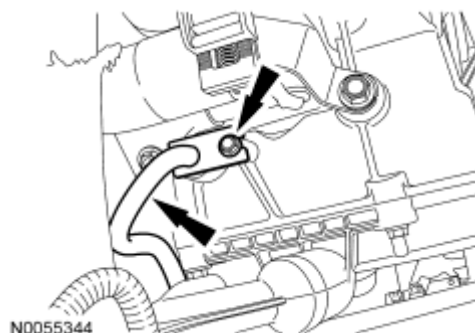
**Fig. 94: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

12. Loosen the transmission fluid cooler tube fitting from the thermal bypass valve.



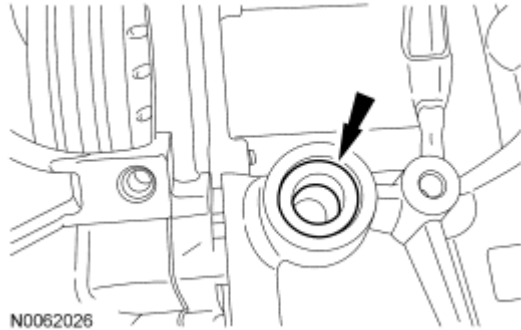
**Fig. 95: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

13. Remove and discard the transmission fluid cooler tube bolt and remove the transmission fluid cooler tube.



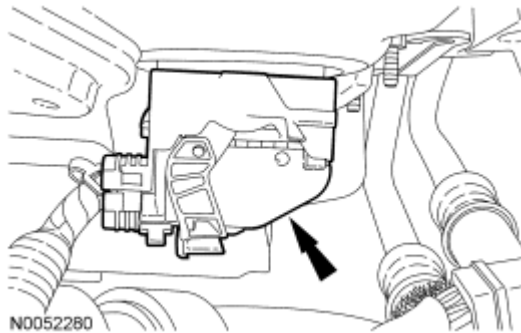
**Fig. 96: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

14. Inspect the transaxle case to make sure that the transmission fluid cooler tube seal and backing ring were removed with the transmission fluid cooler tube and are not stuck in the transaxle case. If the transmission fluid cooler tube seal or backing ring are stuck in the transaxle case, remove the seal and backing ring.



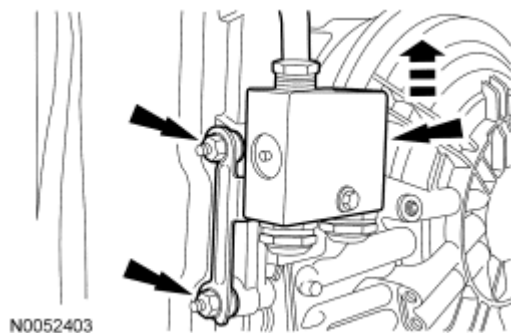
**Fig. 97: Identifying Transmission Fluid Cooler Tube Seal**  
Courtesy of FORD MOTOR CO.

15. Disconnect the transaxle electrical connector.



**Fig. 98: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

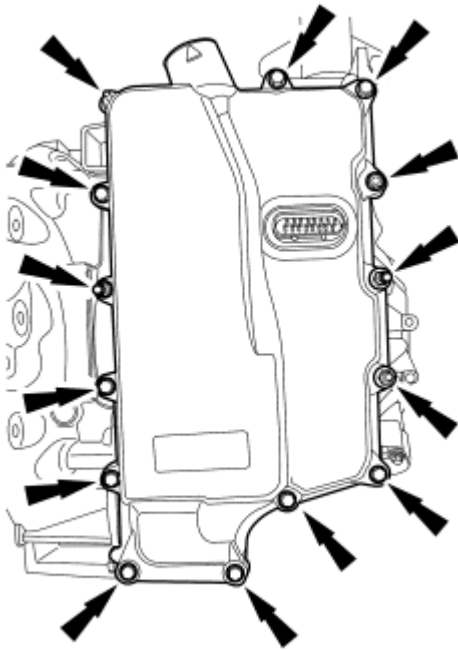
16. Remove the 2 nuts, pull the transmission fluid cooler thermal bypass valve straight up and position it aside.



**Fig. 99: Removing Nuts & Pulling Transmission Fluid Cooler Thermal Bypass Valve Straight Up**  
Courtesy of FORD MOTOR CO.

**NOTE:** Note the location of the stud bolts for assembly.

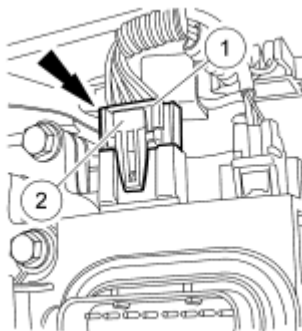
17. Remove the 14 bolts and the main control cover.



N0089296

**Fig. 100: Main Control Valve Cover Bolts**  
Courtesy of FORD MOTOR CO.

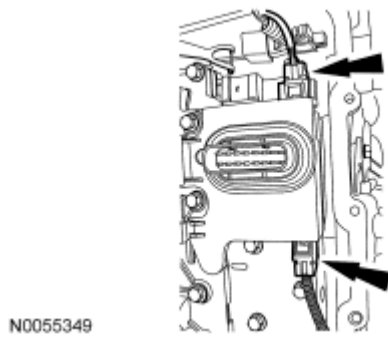
18. Disconnect the Transmission Range (TR) sensor electrical connector.
1. Slide the lock over.
  2. Press the tab and disconnect the connector.



N0055348

**Fig. 101: Pressing Tab & Disconnecting Connector**  
Courtesy of FORD MOTOR CO.

19. Disconnect the Turbine Shaft Speed (TSS) and Output Shaft Speed (OSS) sensor electrical connectors.



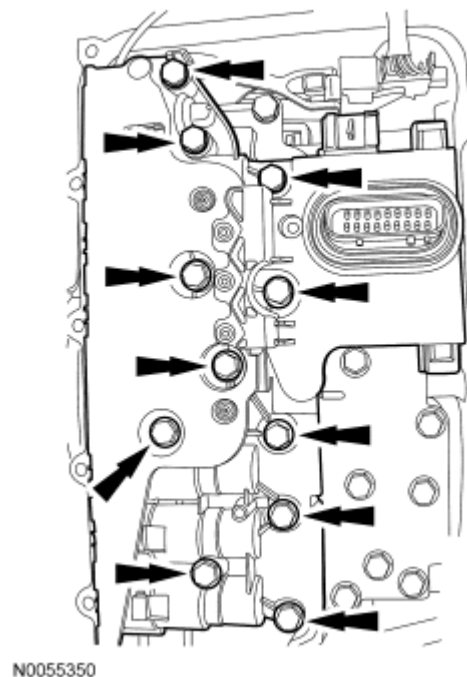
**Fig. 102: Locating Turbine Shaft Speed (TSS) & Output Shaft Speed (OSS) Sensor Electrical Connectors**

Courtesy of FORD MOTOR CO.

**NOTE:** The solenoid body should be handled with care, damage to the solenoid body may occur.

**NOTE:** Note the location of the different length bolts for assembly.

20. Remove the 11 bolts and the solenoid body.



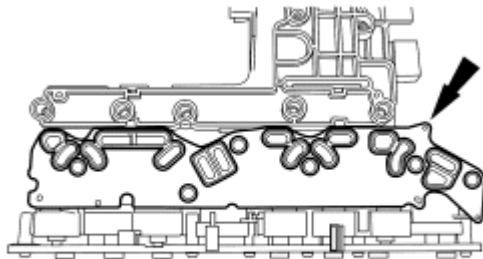
**Fig. 103: Locating Solenoid Body Bolts**

Courtesy of FORD MOTOR CO.

**NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.

**NOTE:** Use care not to break the alignment tabs when installing the solenoid body filter. Damage to the transaxle will occur if the solenoid body is not correctly aligned.

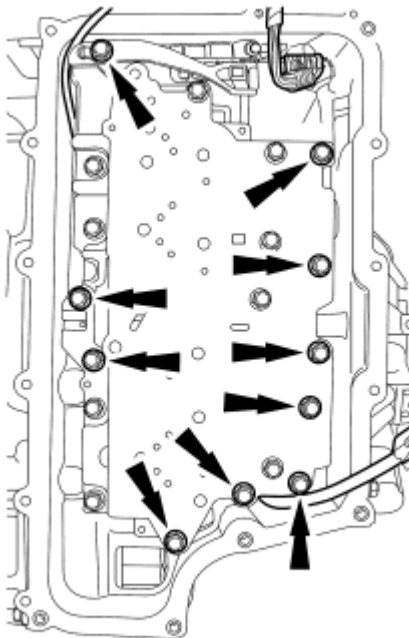
21. Remove the solenoid body filter assembly by pulling it straight up from the alignment tabs. Discard the filter.



N0055016

**Fig. 104: Identifying Solenoid Body Filter Assembly**  
Courtesy of FORD MOTOR CO.

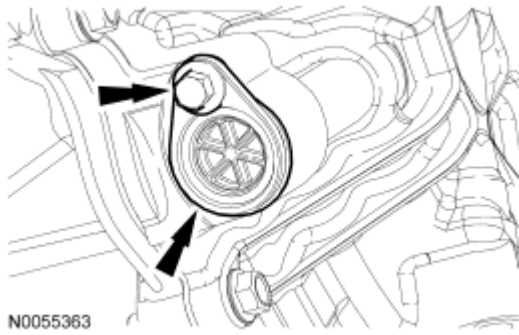
22. Remove the 10 bolts, the TR sensor detent spring and the main control valve body.



N0057465

**Fig. 105: Locating Main Control Valve Body Bolts**  
Courtesy of FORD MOTOR CO.

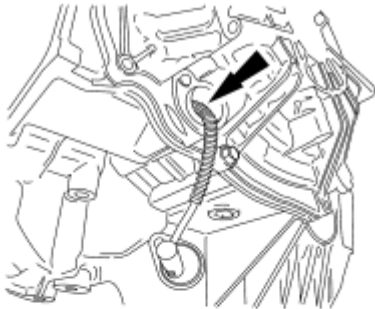
23. Remove the bolt and the TSS sensor.



**Fig. 106: Identifying TSS Sensor & Bolt**  
Courtesy of FORD MOTOR CO.

## INSTALLATION

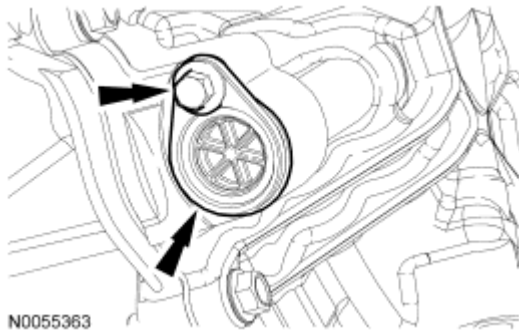
1. Route the TSS sensor wiring harness through the cover and the transaxle case.
  - Tighten to 12 Nm (106 lb-in).



N0061810

**Fig. 107: Routing TSS Sensor Wiring Harness Through Cover & Transaxle Case**  
Courtesy of FORD MOTOR CO.

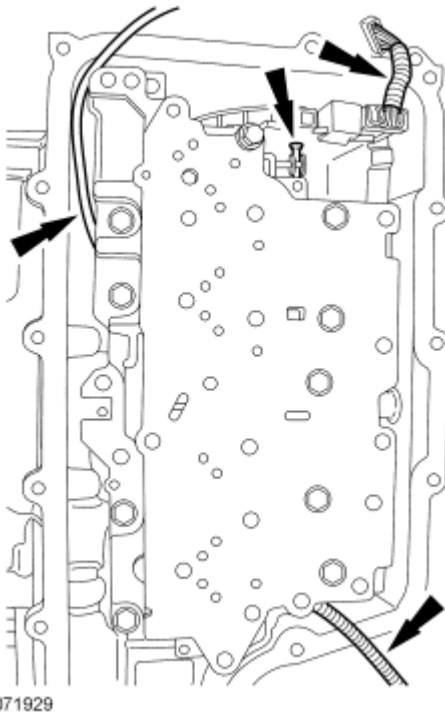
2. Install the TSS sensor in the cover and install the bolt.
  - Tighten to 12 Nm (106 lb-in).



**Fig. 108: Identifying TSS Sensor & Bolt**  
Courtesy of FORD MOTOR CO.

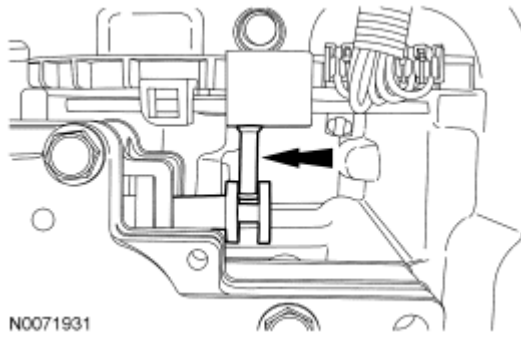
**NOTE:** Make sure that the manual pin (part of the TR sensor) is correctly installed in the manual valve.

3. Position the TSS, OSS and TR sensor wiring harnesses aside and install the main control valve body.



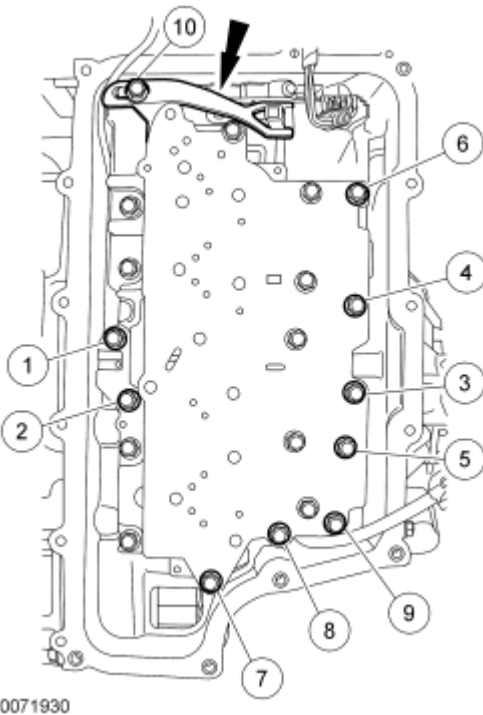
**Fig. 109: Locating TSS, OSS & TR Sensor Wiring Harnesses**  
Courtesy of FORD MOTOR CO.

4. Inspect the manual pin to make sure it is correctly installed in the manual valve. If it is not, pull the valve body off the transaxle case. Correctly install the manual pin in the manual control valve and position the valve body in place.



**Fig. 110: Identifying Manual Pin**  
Courtesy of FORD MOTOR CO.

5. Install the TR sensor detent spring and the 10 bolts. Tighten the bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).



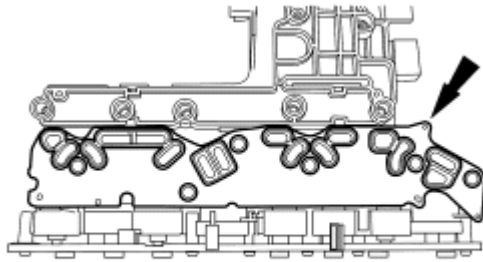
**Fig. 111: Tightening TR Sensor Detent Spring Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

- NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.
- NOTE:** Use care not to break the alignment tabs when installing the solenoid body filter. Damage to the transaxle will occur if the solenoid body is not correctly aligned.



**NOTE:** Make sure that the filter passage areas are clean of foreign material before installing the filter. Damage to the transaxle will occur if the filter passages are not clean.

6. Install a new solenoid body filter assembly by pushing it straight down on to the alignment tabs.



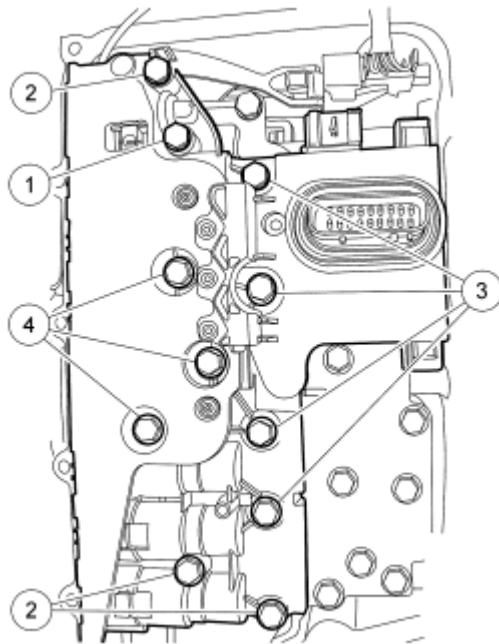
N0055016

**Fig. 112: Identifying Solenoid Body Filter Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure not to pinch the Turbine Shaft Speed (TSS) , Output Shaft Speed (OSS) or Transmission Range (TR) sensor wiring harnesses when installing the solenoid body. Damage to the wiring harness will occur.

**NOTE:** Install the different length bolts in the locations noted during disassembly.

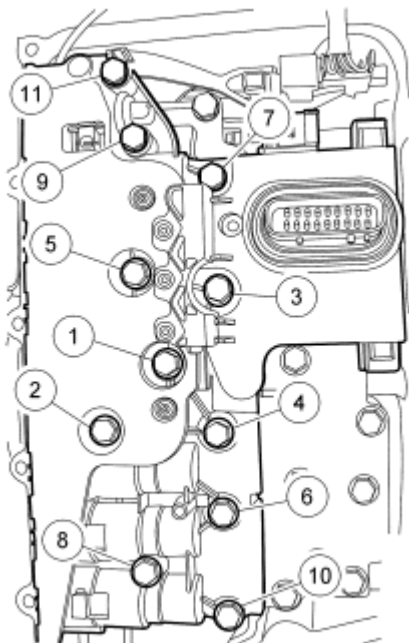
7. Install the solenoid body and the 11 bolts.
  1. 42 mm (1.65 in) bolt
  2. 63 mm (2.48 in) bolts
  3. 80 mm (3.14 in) bolts
  4. 95 mm (3.74 in) bolts



N0057462

**Fig. 113: Locating Solenoid Body Bolts**  
Courtesy of FORD MOTOR CO.

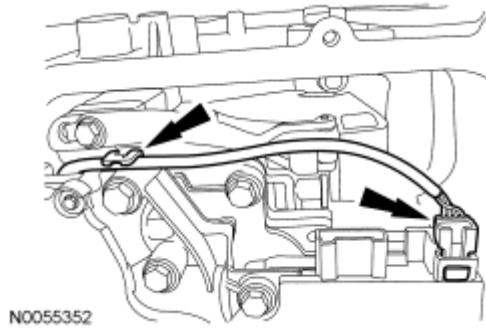
8. Tighten the solenoid body bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).



N0055351

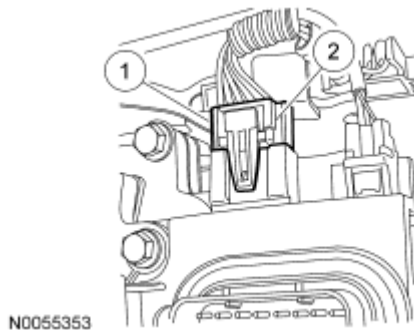
**Fig. 114: Tightening Solenoid Body Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

9. Route the OSS sensor wiring harness and connect the electrical connector.



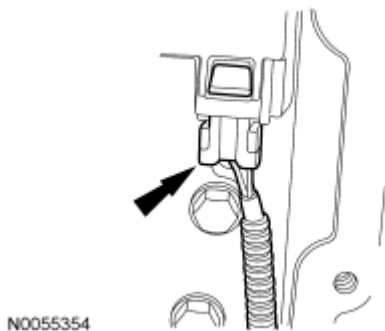
**Fig. 115: Locating OSS Sensor Wiring Harness & Electrical Connector**  
Courtesy of FORD MOTOR CO.

10. Connect the TR sensor electrical connector.
  1. Connect the electrical connector.
  2. Slide the locking tab over.



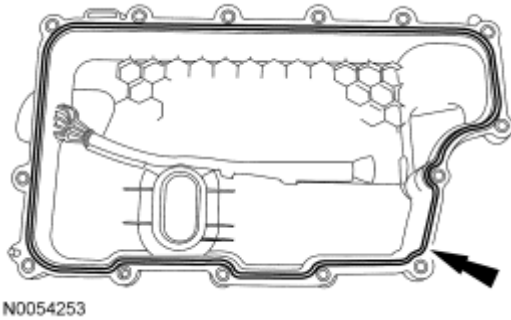
**Fig. 116: Identifying TR Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

11. Connect the TSS sensor electrical connector.



**Fig. 117: Identifying TSS Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

12. Inspect the transaxle side cover seal for damage and install new if necessary.

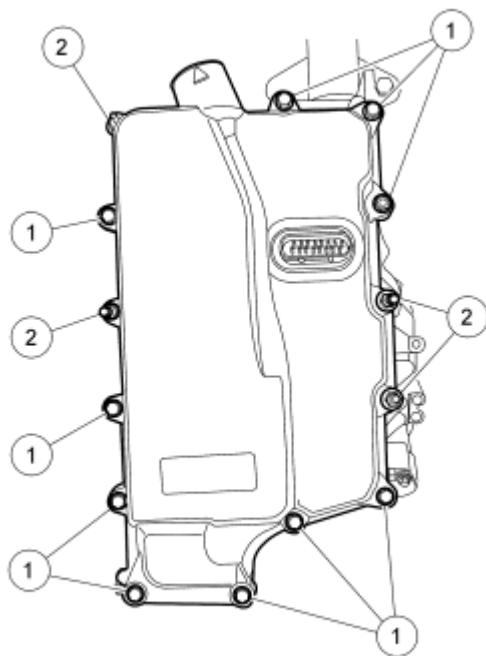


**Fig. 118: Inspecting Transaxle Main Control Cover Seal For Damage**  
Courtesy of FORD MOTOR CO.

**NOTE:** Inspect the 20-pin solenoid body connector seal to make sure that the seal is on the inside of the main control cover or a transmission fluid leak will occur.

**NOTE:** Install the studbolts in the locations noted during disassembly.

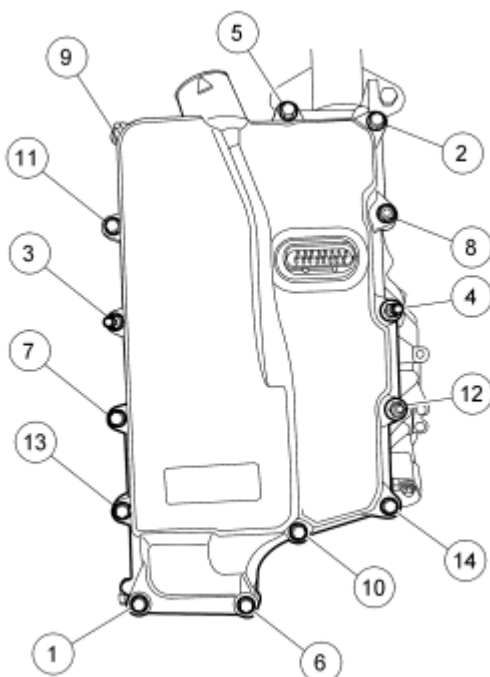
13. Install the main control cover and install the 14 bolts.
  1. Bolt location
  2. Studbolt location



N0089295

**Fig. 119: Main Control Cover Bolts**  
Courtesy of FORD MOTOR CO.

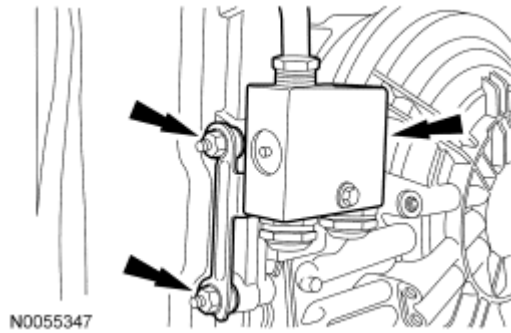
14. Tighten the main control cover bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).



N0089294

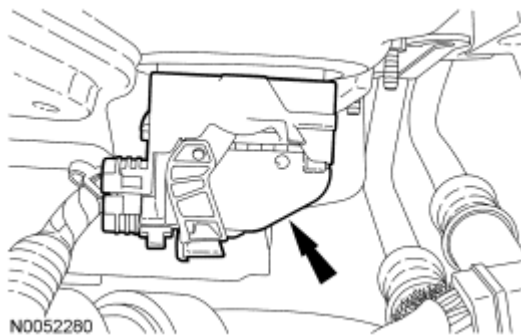
**Fig. 120: Main Control Cover Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

15. Position the transmission fluid cooler thermal bypass valve and transmission fluid cooler tube assembly in place and install the 2 transmission fluid cooler line bracket nuts.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 121: Identifying Transmission Fluid Cooler Tube Assembly & Nuts**  
Courtesy of FORD MOTOR CO.

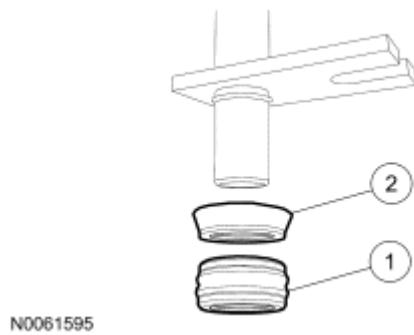
16. Connect the transaxle electrical connector.



**Fig. 122: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

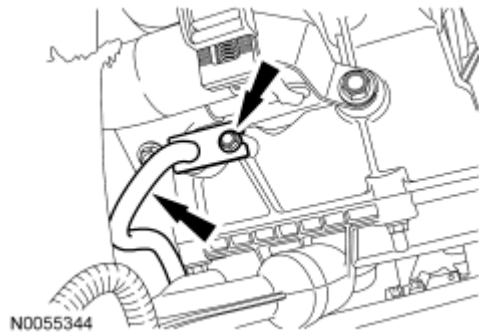
17. Inspect the transmission fluid cooler tube backing ring and seal for damage and install a new backing ring or seal if necessary. Lubricate the transmission fluid cooler tube seal with clean transmission fluid and install the backing ring and seal on the transmission fluid cooler tube.

Item	Part Number	Description
1	7D285	Seal
2	7J324	Backing ring



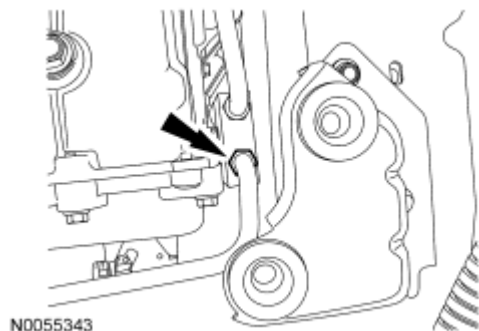
**Fig. 123: Identifying Transmission Fluid Cooler Tube Backing Ring & Seal**  
Courtesy of FORD MOTOR CO.

18. Position the transmission fluid cooler tube in place and install a new bolt.
  - Tighten to 9 Nm (80 lb-in).



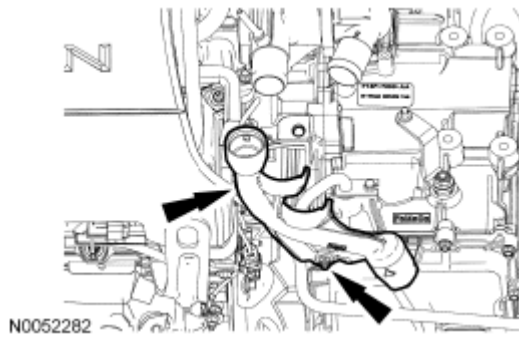
**Fig. 124: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

19. Tighten the transmission fluid cooler tube fitting.
  - Tighten to 25 Nm (18 lb-ft).



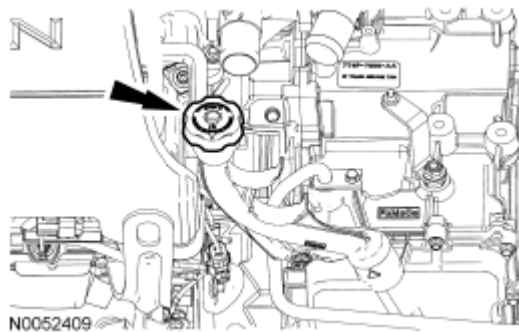
**Fig. 125: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

20. Install the transmission fluid filler tube and the nut.
  - Tighten to 11 Nm (97 lb-in).



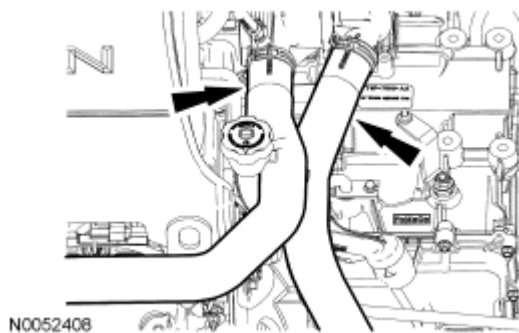
**Fig. 126: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

21. Install the transmission fluid level indicator.



**Fig. 127: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

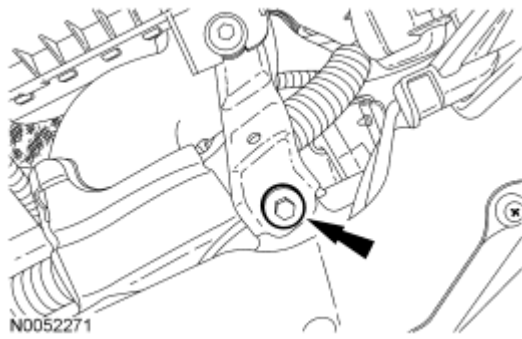
22. Route the coolant hoses in the transmission fluid filler tube.



**Fig. 128: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

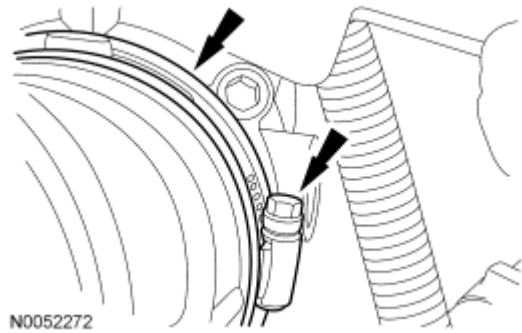
23. Position the ACL assembly in place and install the bolt.
- Tighten to 11 Nm (97 lb-in).





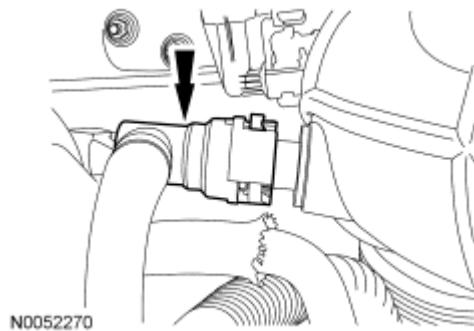
**Fig. 129: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

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



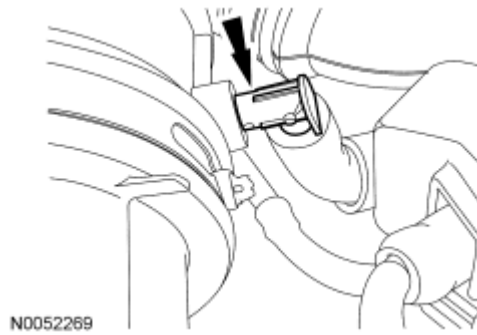
**Fig. 130: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

25. Connect the engine breather to the ACL assembly.



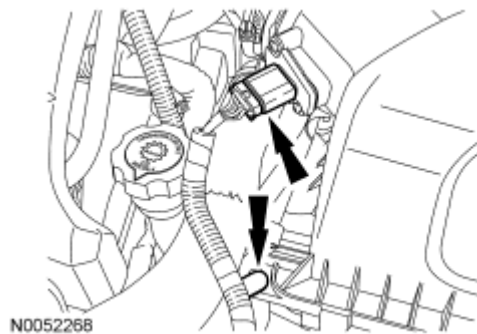
**Fig. 131: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

26. Connect the brake booster vacuum hose to the ACL assembly.



**Fig. 132: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

27. Connect the MAF sensor electrical connector and connect the electrical harness fastener.



**Fig. 133: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

28. Fill with clean transmission fluid to the correct level.

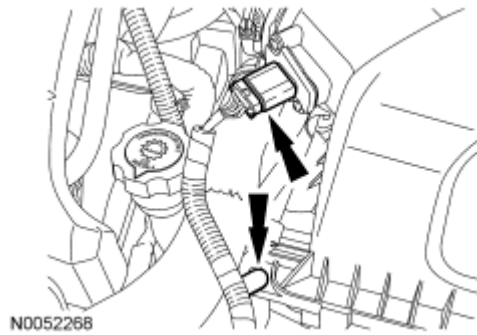
## OUTPUT SHAFT SPEED (OSS) SENSOR

### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

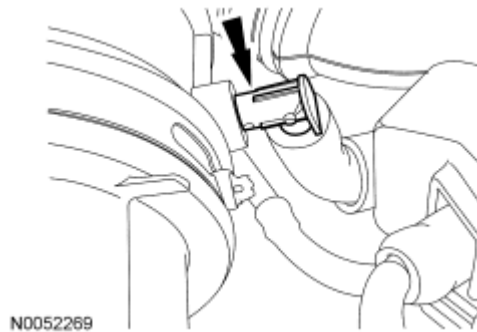
### REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.
2. Disconnect the Mass Air Flow (MAF) sensor electrical connector and the wiring harness fastener from the Air Cleaner (ACL) assembly.



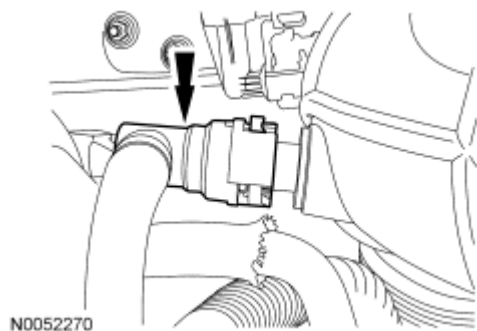
**Fig. 134: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

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



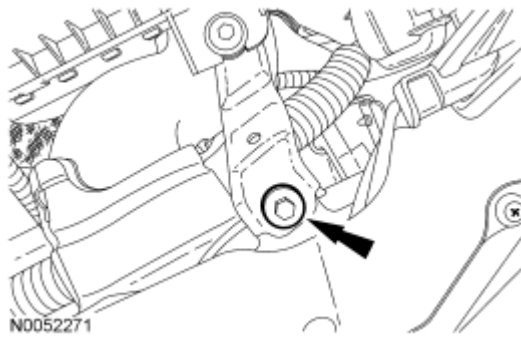
**Fig. 135: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

4. Disconnect the engine breather from the ACL assembly.



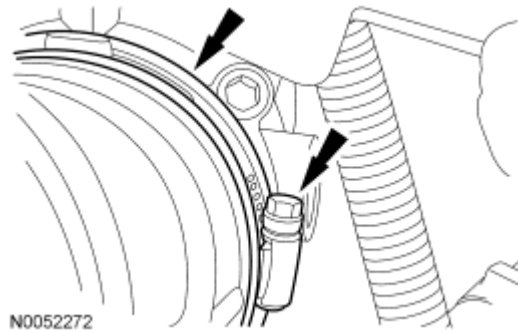
**Fig. 136: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

5. Remove the ACL assembly bracket bolt.



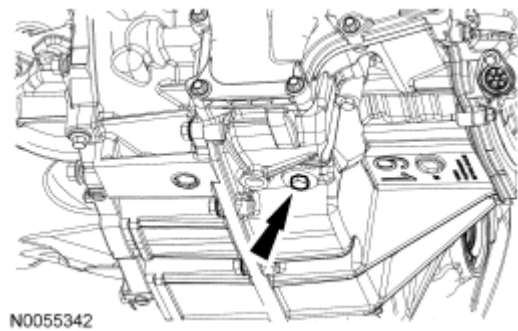
**Fig. 137: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

6. Loosen the ACL outlet pipe clamp at the Throttle Body (TB) and remove the ACL and ACL outlet pipe assembly.



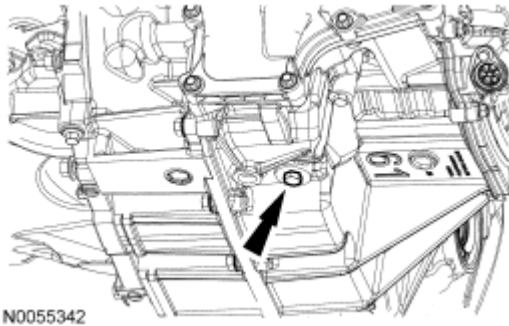
**Fig. 138: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

7. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



**Fig. 139: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

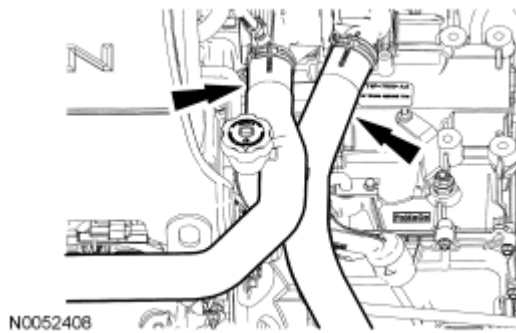
8. Install the transmission fluid drain plug.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 140: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses do not need to be removed from the engine.

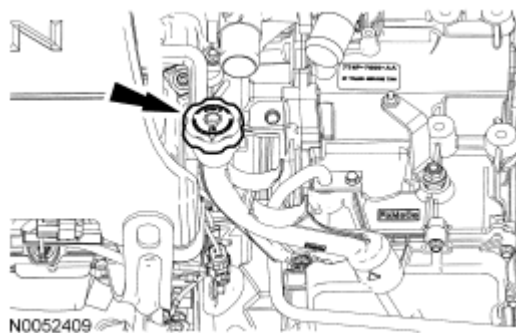
9. Remove the coolant hoses from the transmission fluid filler tube and position aside.



**Fig. 141: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

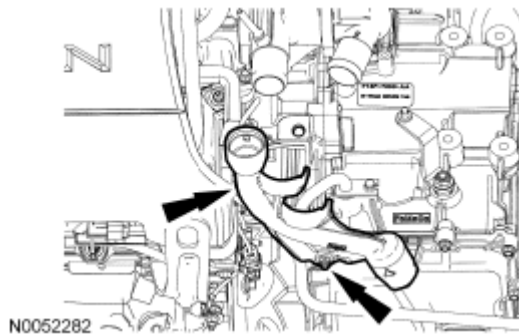
10. Remove the transmission fluid level indicator.



**Fig. 142: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

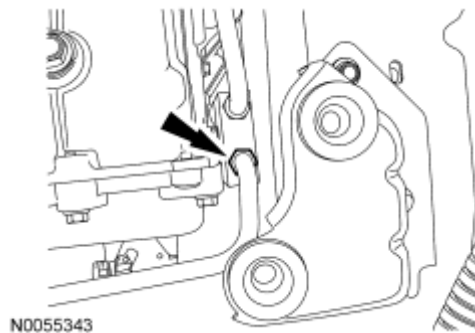
**NOTE:** The coolant hoses have been removed for clarity.

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



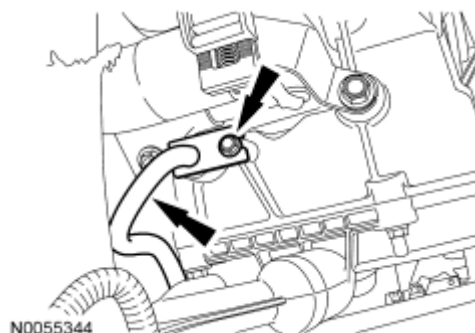
**Fig. 143: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

12. Loosen the transmission fluid cooler tube fitting from the thermal bypass valve.



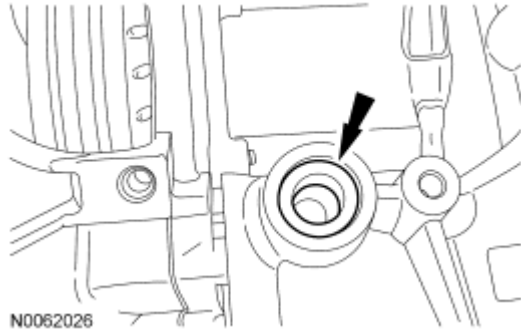
**Fig. 144: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

13. Remove and discard the transmission fluid cooler tube bolt and remove the transmission fluid cooler tube.



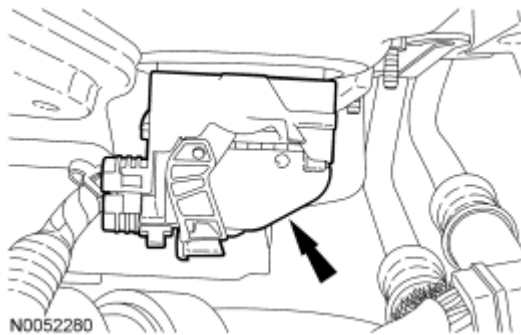
**Fig. 145: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

14. Inspect the transaxle case to make sure that the transmission fluid cooler tube seal and backing ring were removed with the transmission fluid cooler tube and are not stuck in the transaxle case. If the transmission fluid cooler tube seal or backing ring are stuck in the transaxle case, remove the seal and backing ring.



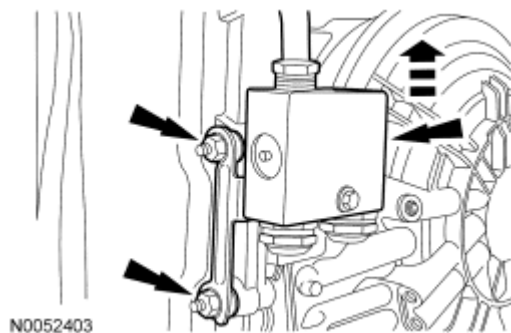
**Fig. 146: Identifying Transmission Fluid Cooler Tube Seal**  
Courtesy of FORD MOTOR CO.

15. Disconnect the transaxle electrical connector.



**Fig. 147: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

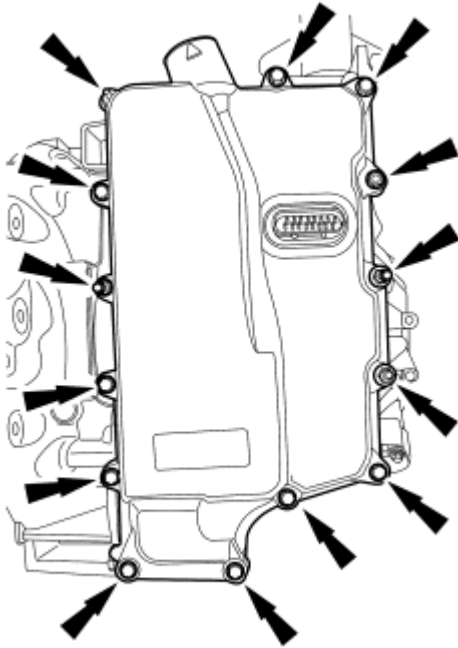
16. Remove the 2 nuts, pull the transmission fluid cooler thermal bypass valve straight up and position it aside.



**Fig. 148: Removing Nuts & Pulling Transmission Fluid Cooler Thermal Bypass Valve Straight Up**  
Courtesy of FORD MOTOR CO.

**NOTE:** Note the location of the stud bolts for assembly.

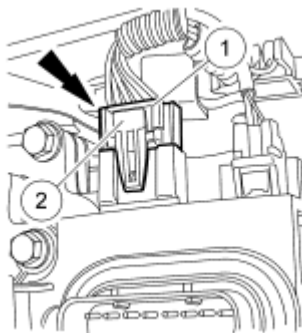
17. Remove the 14 bolts and the main control cover.



N0089296

**Fig. 149: Main Control Valve Cover Bolts**  
Courtesy of FORD MOTOR CO.

18. Disconnect the Transmission Range (TR) sensor electrical connector.
1. Slide the lock over.
  2. Press the tab and disconnect the connector.

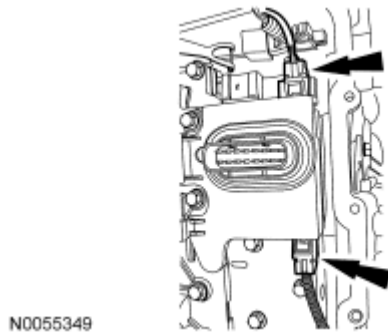


N0055348

**Fig. 150: Pressing Tab & Disconnecting Connector**  
Courtesy of FORD MOTOR CO.

19. Disconnect the Turbine Shaft Speed (TSS) and Output Shaft Speed (OSS) sensor electrical connectors.





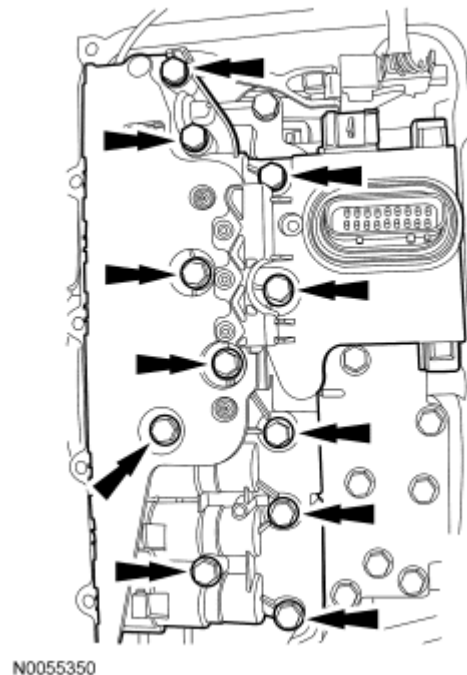
**Fig. 151: Locating Turbine Shaft Speed (TSS) & Output Shaft Speed (OSS) Sensor Electrical Connectors**

Courtesy of FORD MOTOR CO.

**NOTE:** The solenoid body should be handled with care or damage to the solenoid body may occur.

**NOTE:** Note the location of the different length bolts for assembly.

20. Remove the 11 bolts and the solenoid body.



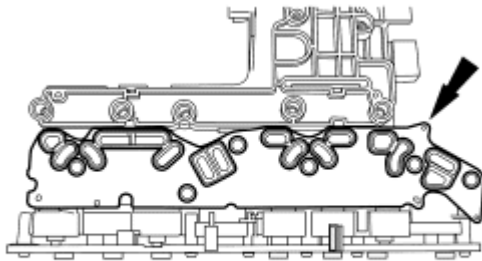
**Fig. 152: Locating Solenoid Body Bolts**

Courtesy of FORD MOTOR CO.

**NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.

**NOTE:** Use care not to break the alignment tabs when removing the solenoid body filter. Damage to the transaxle will occur if the solenoid body is not correctly aligned.

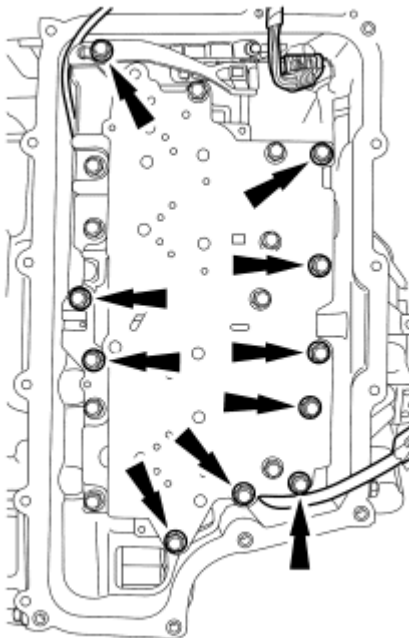
21. Remove the solenoid body filter assembly by pulling it straight up from the alignment tabs. Discard the filter.



N0055016

**Fig. 153: Identifying Solenoid Body Filter Assembly**  
Courtesy of FORD MOTOR CO.

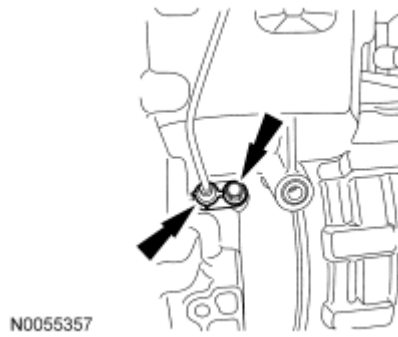
22. Remove the 10 bolts, the TR sensor detent spring and the main control valve body.



N0057465

**Fig. 154: Locating Main Control Valve Body Bolts**  
Courtesy of FORD MOTOR CO.

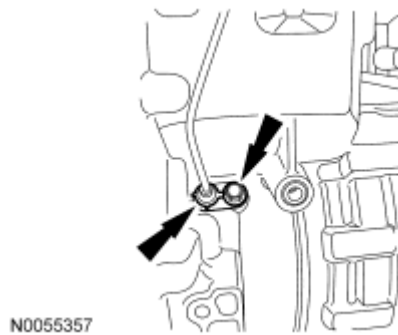
23. Remove the bolt and the OSS sensor.



**Fig. 155: Identifying OSS Sensor & Bolt**  
Courtesy of FORD MOTOR CO.

#### INSTALLATION

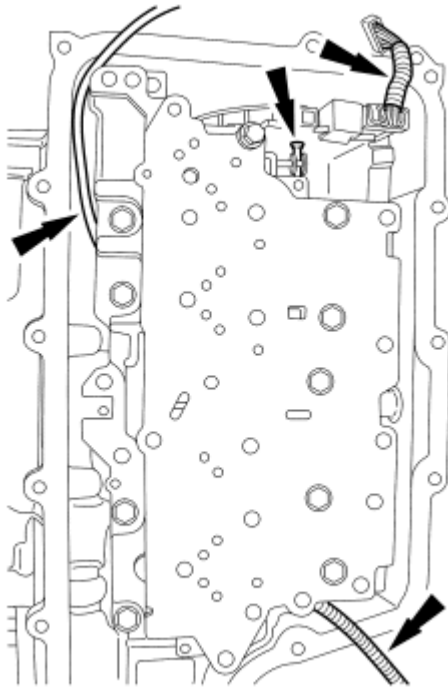
1. Install the OSS sensor and the bolt.
  - Tighten to 12 Nm (106 lb-in).



**Fig. 156: Identifying OSS Sensor & Bolt**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure that the manual pin (part of the TR sensor) is correctly installed in the manual valve.

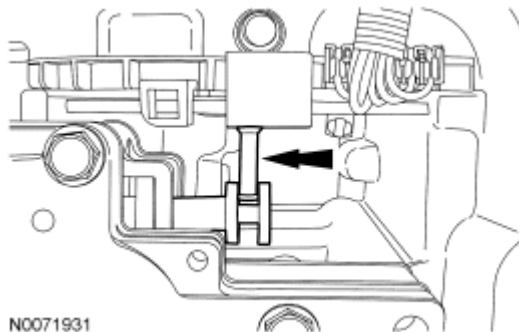
2. Position the TSS, OSS and TR sensor wiring harnesses aside and install the main control valve body.



N0071929

**Fig. 157: Locating TSS, OSS & TR Sensor Wiring Harnesses**  
Courtesy of FORD MOTOR CO.

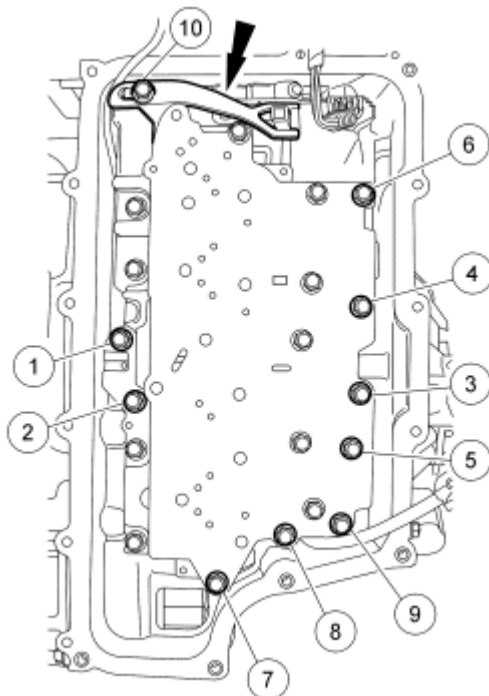
3. Inspect the manual pin to make sure it is correctly installed in the manual valve. If it is not, pull the valve body off the transaxle case. Correctly install the manual pin in the manual valve and position the valve body in place.



N0071931

**Fig. 158: Identifying Manual Pin**  
Courtesy of FORD MOTOR CO.

4. Install the TR sensor detent spring and the 10 bolts. Tighten the bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).

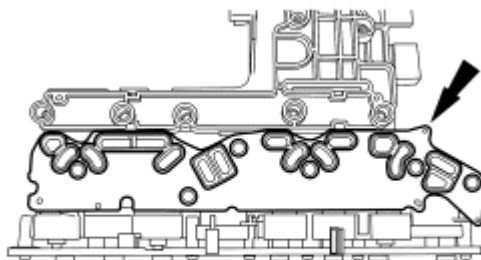


N0071930

**Fig. 159: Tightening TR Sensor Detent Spring Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

- NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.
- NOTE:** Use care not to break the alignment tabs when installing the solenoid body filter. Damage to the transaxle will occur if the solenoid body is not correctly aligned.
- NOTE:** Make sure that the filter passage areas are clean of foreign material before installing the filter. Damage to the transaxle will occur if the filter passages are not clean.

5. Install a new solenoid body filter assembly by pushing it straight down on to the alignment tabs.



N0055016

**Fig. 160: Identifying Solenoid Body Filter Assembly**

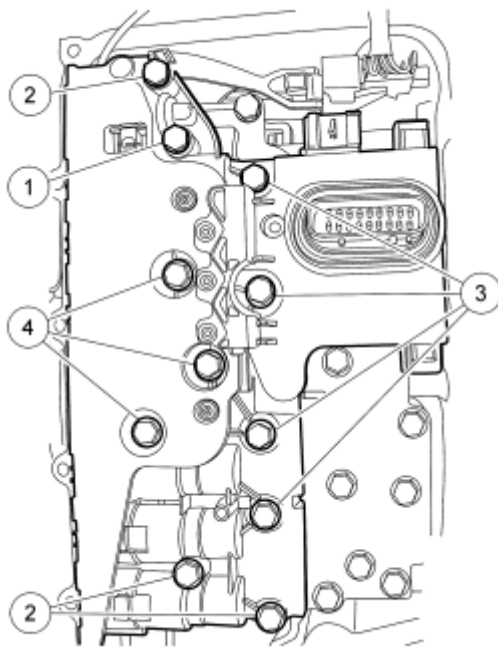
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure not to pinch the Turbine Shaft Speed (TSS), Output Shaft Speed (OSS) or Transmission Range (TR) sensor wiring harnesses when installing the solenoid body. Damage to the wiring harness will occur.

**NOTE:** Install the different length bolts in the locations noted during disassembly.

6. Install the solenoid body and the 11 bolts.

1. 42 mm (1.65 in) bolt
2. 63 mm (2.48 in) bolts
3. 80 mm (3.14 in) bolts
4. 95 mm (3.74 in) bolts



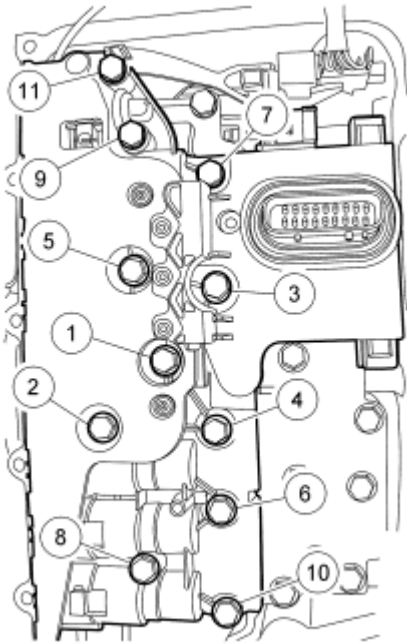
N0057462

**Fig. 161: Locating Solenoid Body Bolts**

Courtesy of FORD MOTOR CO.

7. Tighten the solenoid body bolts in the sequence shown.

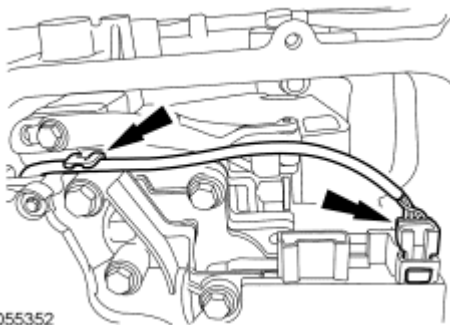
- Tighten to 12 Nm (106 lb-in).



N0055351

**Fig. 162: Tightening Solenoid Body Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

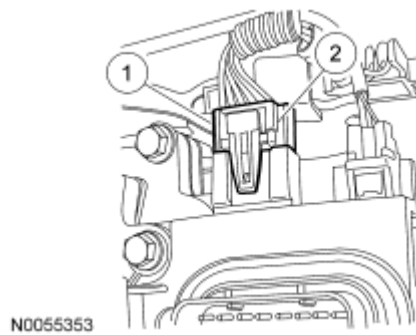
8. Route the OSS sensor wiring harness and connect the electrical connector.



N0055352

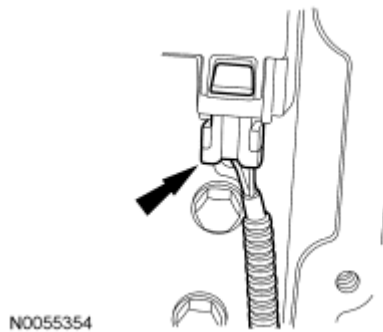
**Fig. 163: Locating OSS Sensor Wiring Harness & Electrical Connector**  
Courtesy of FORD MOTOR CO.

9. Connect the TR sensor electrical connector.
  1. Connect the electrical connector.
  2. Slide the locking tab over.



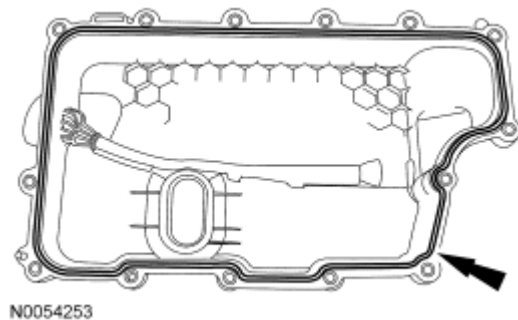
**Fig. 164: Identifying TR Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

10. Connect the TSS sensor electrical connector.



**Fig. 165: Identifying TSS Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

11. Inspect the transaxle side cover seal for damage and install new if necessary.



**Fig. 166: Inspecting Transaxle Main Control Cover Seal For Damage**  
Courtesy of FORD MOTOR CO.

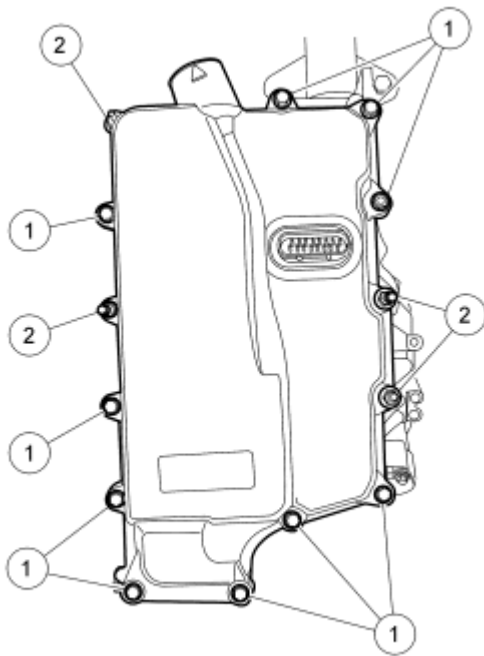
**NOTE:** Inspect the 20-pin solenoid body connector seal to make sure that the seal is on the inside of the main control cover or a transmission fluid leak will occur.



**NOTE:** Install the studbolts in the locations noted during disassembly.

12. Install the main control cover and loosely install the 14 bolts.

1. Bolt location
2. Studbolt location

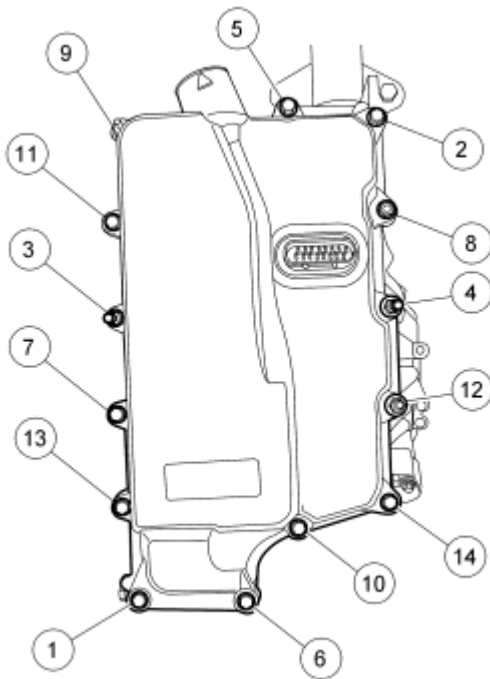


N0089295

**Fig. 167: Main Control Cover Bolts**  
Courtesy of FORD MOTOR CO.

13. Tighten the main control cover bolts in the sequence shown.

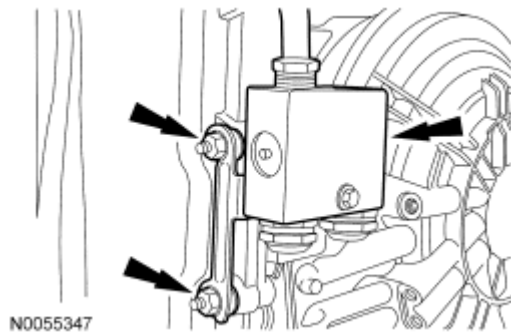
- Tighten to 12 Nm (106 lb-in).



N0089294

**Fig. 168: Main Control Cover Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

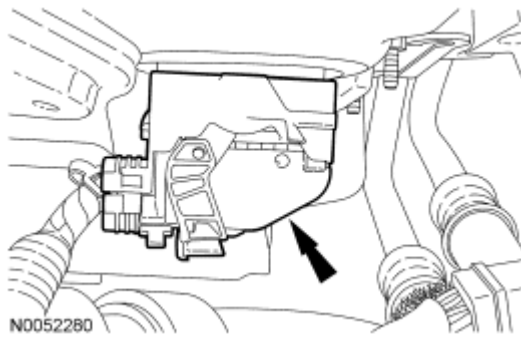
14. Position the transmission fluid cooler thermal bypass valve and transmission fluid cooler tube assembly in place and install the 2 transmission fluid cooler tube bracket nuts.
  - Tighten to 9 Nm (80 lb-in).



N0055347

**Fig. 169: Identifying Transmission Fluid Cooler Tube Assembly & Nuts**  
Courtesy of FORD MOTOR CO.

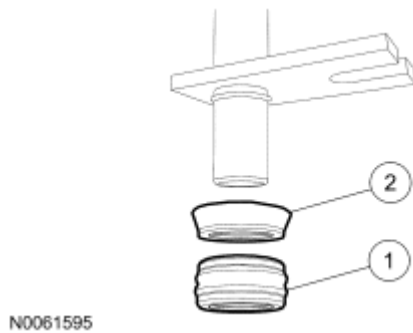
15. Connect the transaxle electrical connector.



**Fig. 170: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

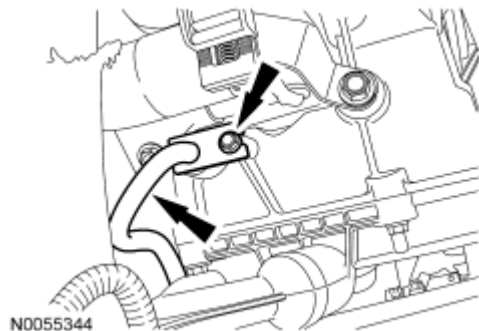
16. Inspect the transmission fluid cooler tube backing ring and seal for damage and install a new backing ring or seal if necessary. Lubricate the transmission fluid cooler tube seal with clean transmission fluid and install the backing ring and seal on the transmission fluid cooler tube.

Item	Part Number	Description
1	7D285	Seal
2	7J324	Backing ring



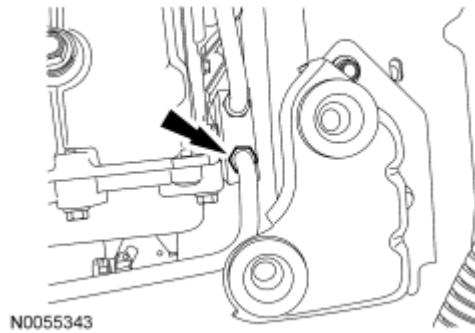
**Fig. 171: Identifying Transmission Fluid Cooler Tube Backing Ring & Seal**  
Courtesy of FORD MOTOR CO.

17. Position the transmission fluid cooler tube in place and install a new bolt.
  - Tighten to 9 Nm (80 lb-in).



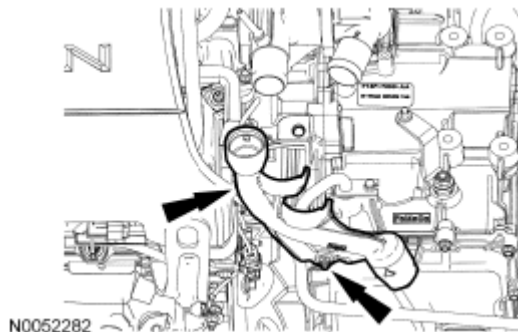
**Fig. 172: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

18. Tighten the transmission fluid cooler tube fitting.
  - Tighten to 25 Nm (18 lb-ft).



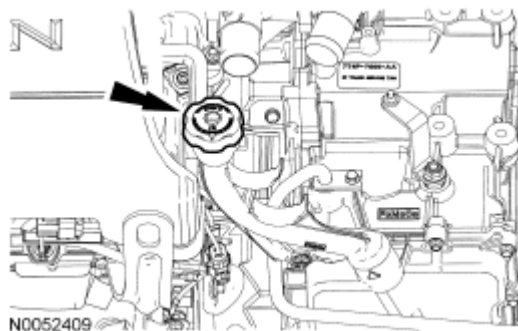
**Fig. 173: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

19. Install the transmission fluid filler tube and the nut.
  - Tighten to 11 Nm (97 lb-in).



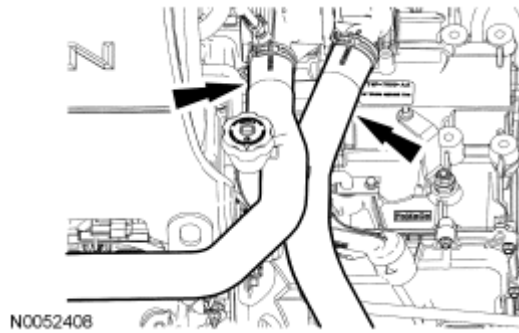
**Fig. 174: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

20. Install the transmission fluid level indicator.



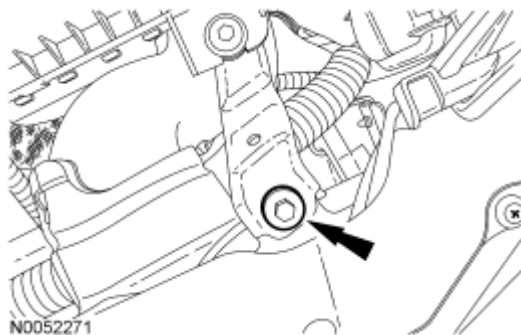
**Fig. 175: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

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



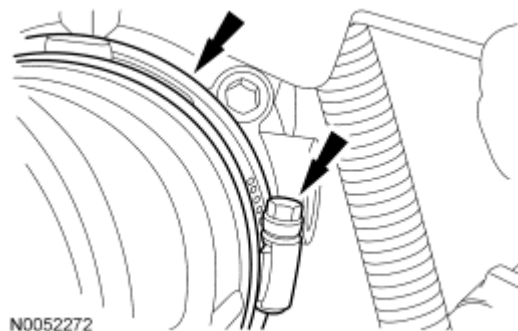
**Fig. 176: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

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



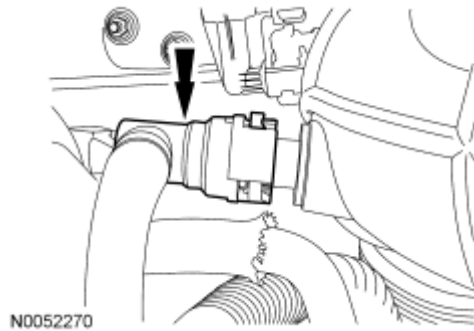
**Fig. 177: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

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



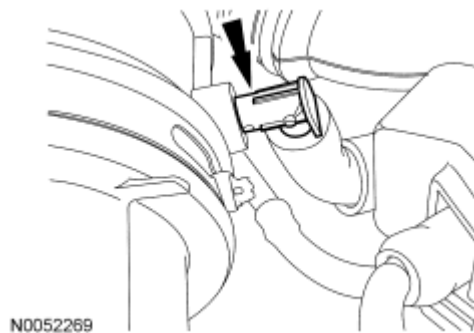
**Fig. 178: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

24. Connect the engine breather to the ACL assembly.



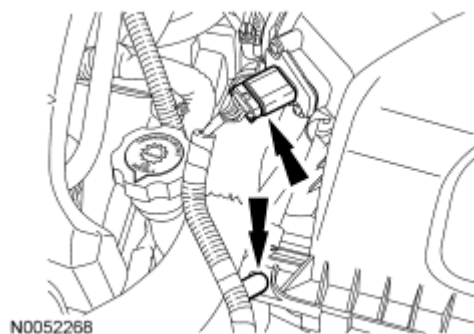
**Fig. 179: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

25. Connect the brake booster vacuum hose to the ACL assembly.



**Fig. 180: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

26. Connect the MAF sensor electrical connector and connect the electrical harness fastener.



**Fig. 181: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.


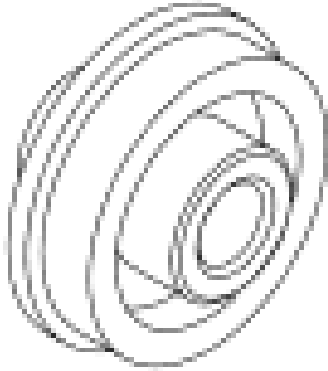
## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

27. Fill with clean transmission fluid to the correct level.

### HALFSHAFT SEAL - LH

#### Special Tools

Illustration	Tool Name	Tool Number
 <b>ST1255-A</b>	Adapter for 303-224 (Handle)	205-153 (T80T-4000-W)
 <b>ST3004-A</b>	Installer, Halfshaft Seal	307-582A

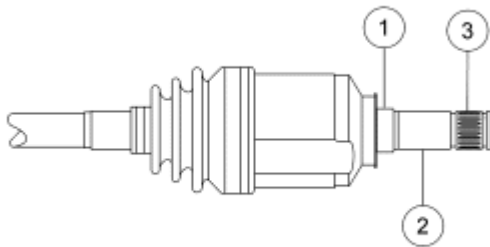
#### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

#### REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.
2. Remove the front LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.

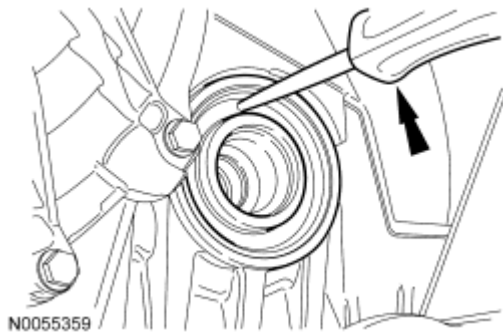
3. Inspect the halfshaft hub for wear or damage and install a new halfshaft if necessary.
  1. Inspect the differential seal surface.
  2. Inspect the halfshaft bushing surface. If this surface is damaged, inspect the halfshaft bushing for damage.
  3. Inspect the differential side gear splines.



N0055750

**Fig. 182: Identifying Differential Side Gear Splines, Halfshaft Bushing & Differential Seal**  
Courtesy of FORD MOTOR CO.

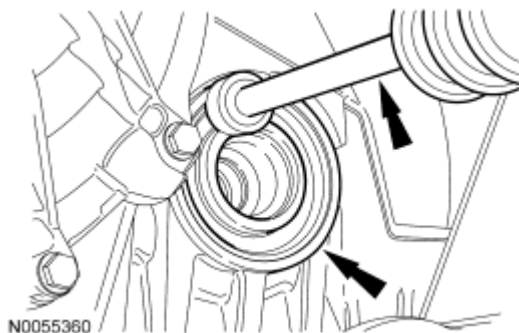
4. Using a suitable awl, poke a small hole in the halfshaft seal.



N0055359

**Fig. 183: Poking A Small Hole In The Halfshaft Seal Using A Suitable Awl**  
Courtesy of FORD MOTOR CO.

5. Using a suitable dent puller, remove the halfshaft seal.



N0055360

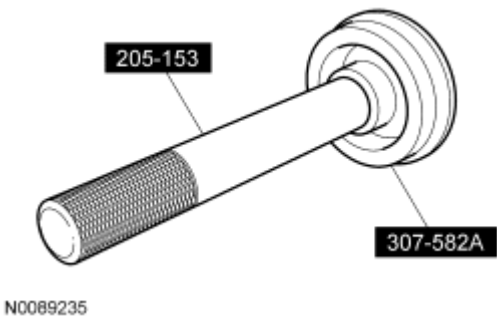
**Fig. 184: Removing Halfshaft Seal Using A Suitable Dent Puller**



Courtesy of FORD MOTOR CO.

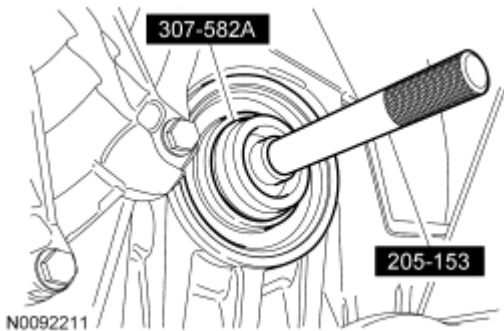
INSTALLATION

- 1. Install a new halfshaft seal on the Cover Axle Seal Installer and Handle.



**Fig. 185: Axle Seal Installer & Handle**  
Courtesy of FORD MOTOR CO.

- 2. Using the Cover Axle Seal Installer and Handle, install the LH halfshaft seal.



**Fig. 186: Installing LH Halfshaft Seal**  
Courtesy of FORD MOTOR CO.

- 3. Install the front LH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
- 4. Fill with clean transmission fluid to the correct level.

HALFSHAFT SEAL - RH

Special Tools

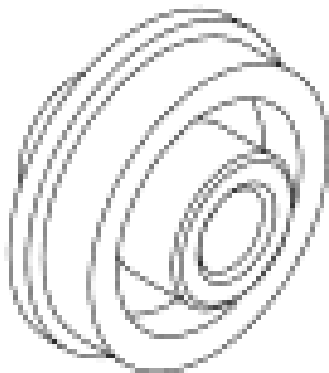
Illustration	Tool Name	Tool Number
	Adapter for 303-224 (Handle)	205-153 (T80T-4000-W)

## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX



**ST1255-A**



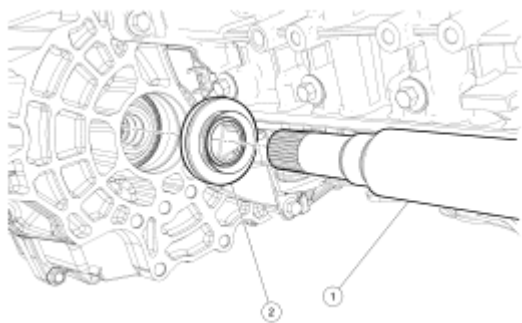
**ST3004-A**

Installer, Halfshaft Seal

307-582A

### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V



**Fig. 187: Halfshaft & Seal**  
Courtesy of FORD MOTOR CO.

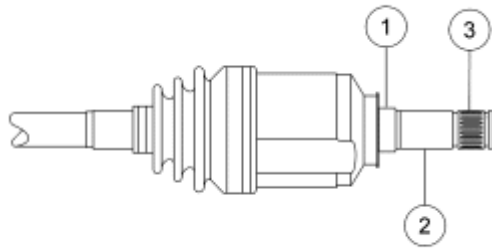
## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

Item	Part Number	Description
1	3K183	Intermediate shaft
2	7H260	Seal assembly - halfshaft

### REMOVAL

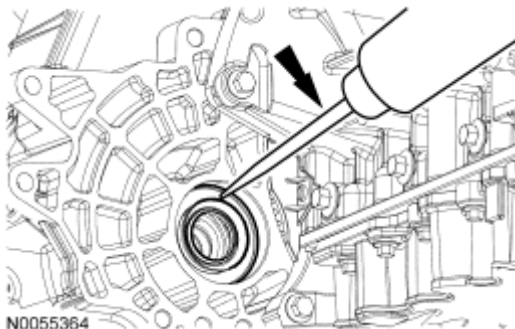
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.
2. Remove the RH front wheel and tire. For additional information, refer to **WHEELS & TIRES** article.
3. Remove the RH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
4. Inspect the halfshaft hub for wear or damage and install a new halfshaft if necessary.
  1. Inspect the differential seal surface.
  2. Inspect the halfshaft bushing surface. If this surface is damaged, inspect the halfshaft bushing for damage.
  3. Inspect the differential side gear splines.



N0055750

**Fig. 188: Identifying Differential Side Gear Splines, Halfshaft Bushing & Differential Seal**  
Courtesy of FORD MOTOR CO.

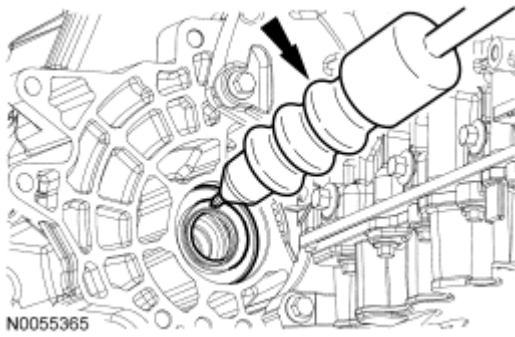
5. Using a suitable awl, poke a small hole in the halfshaft seal.



N0055364

**Fig. 189: Poking A Small Hole In Halfshaft Seal Using A Suitable Awl**  
Courtesy of FORD MOTOR CO.

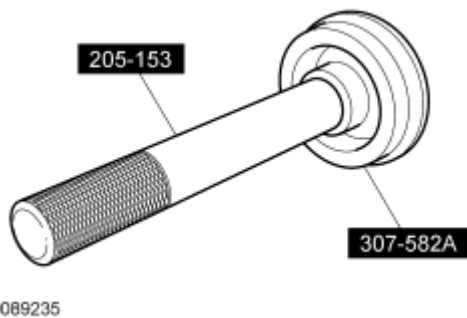
6. Using a suitable dent puller, remove the halfshaft seal.



**Fig. 190: Removing Halfshaft Seal Using A Suitable Dent Puller**  
Courtesy of FORD MOTOR CO.

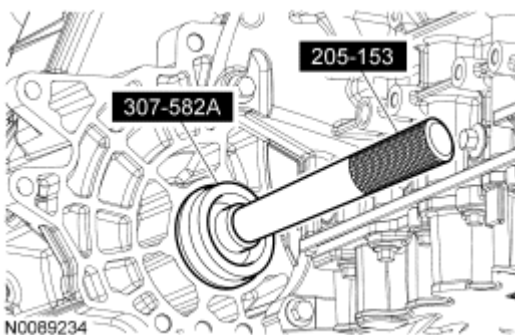
## INSTALLATION

1. Install a new halfshaft seal on the Cover Axle Seal Installer and Handle.



**Fig. 191: Axle Seal Installer & Handle**  
Courtesy of FORD MOTOR CO.

2. Using the Cover Axle Seal Installer and Handle, install the RH halfshaft seal.



**Fig. 192: installing RH Halfshaft Seal**  
Courtesy of FORD MOTOR CO.

3. Install the RH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
4. Install the RH wheel and tire. For additional information, refer to **WHEELS & TIRES** article.

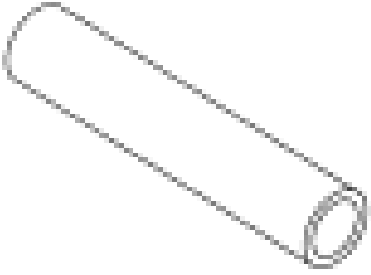
## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

5. Fill with clean automatic transmission fluid to the correct level.

### DIGITAL TRANSMISSION RANGE (TR) SENSOR

#### Special Tools

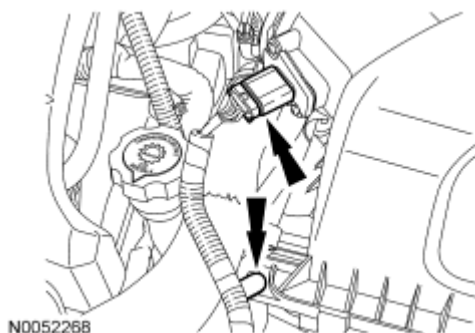
Illustration	Tool Name	Tool Number
 ST3000-A	Installer, Manual Lever Retaining Pin	307-592

#### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

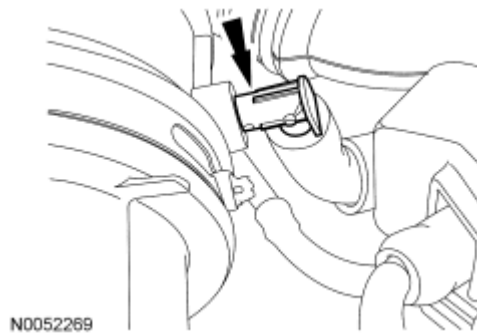
#### REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.
2. Disconnect the Mass Air Flow (MAF) sensor electrical connector and the wiring harness fastener from the Air Cleaner (ACL) assembly.



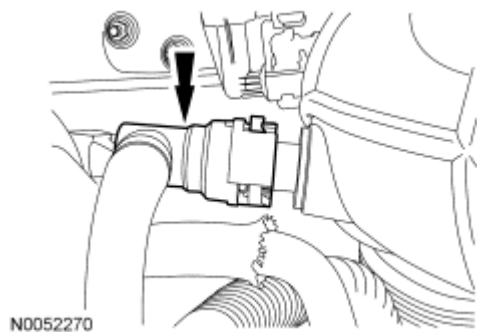
**Fig. 193: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

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



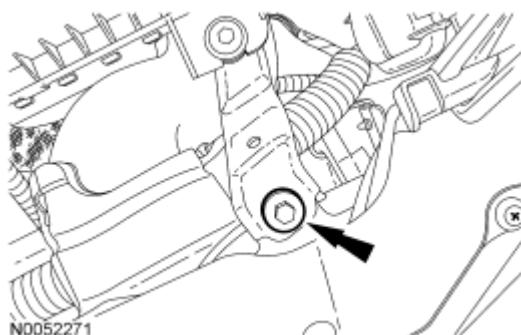
**Fig. 194: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

4. Disconnect the engine breather from the ACL assembly.



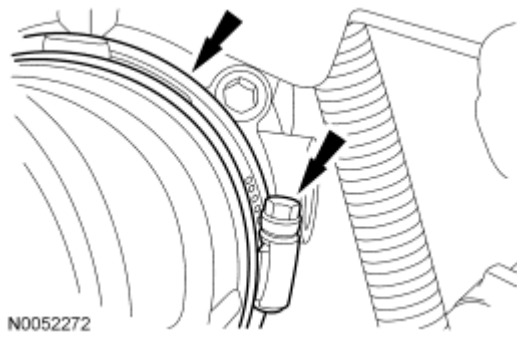
**Fig. 195: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

5. Remove the ACL assembly bracket bolt.



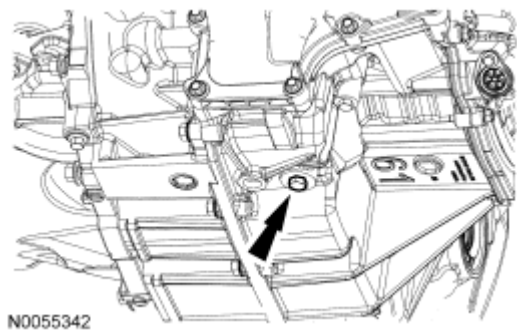
**Fig. 196: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

6. Loosen the ACL outlet pipe clamp at the Throttle Body (TB) and remove the ACL and ACL outlet pipe assembly.



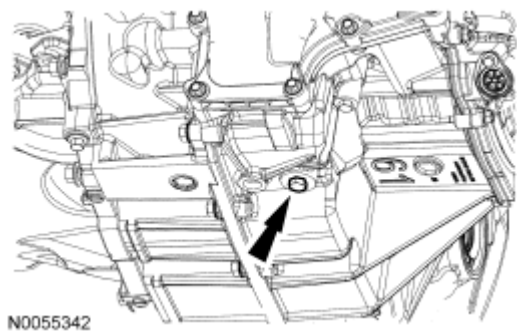
**Fig. 197: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

7. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



**Fig. 198: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

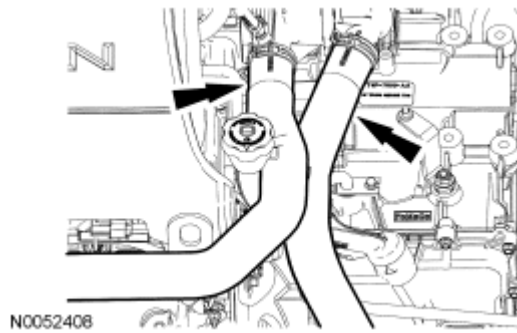
8. Install the transmission fluid drain plug.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 199: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses do not need to be removed from the engine.

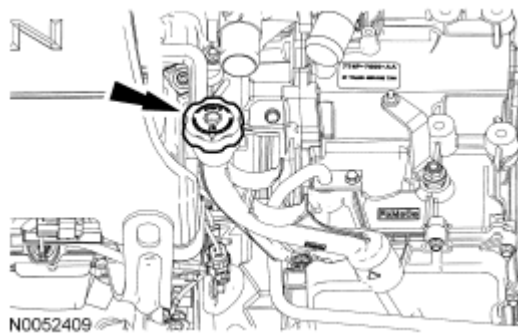
9. Remove the coolant hoses from the transmission fluid filler tube and position aside.



**Fig. 200: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

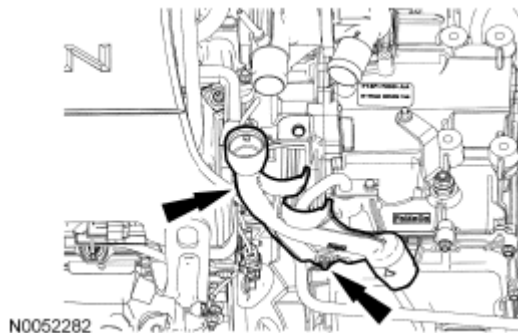
10. Remove the transmission fluid level indicator.



**Fig. 201: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

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



**Fig. 202: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

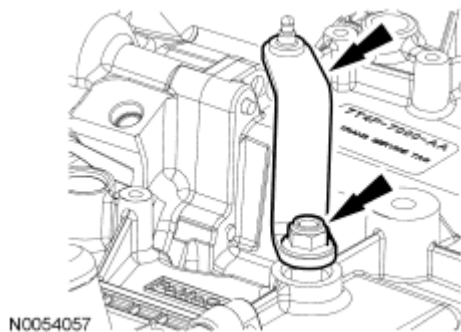


12. Disconnect the selector lever cable end from the manual control lever.



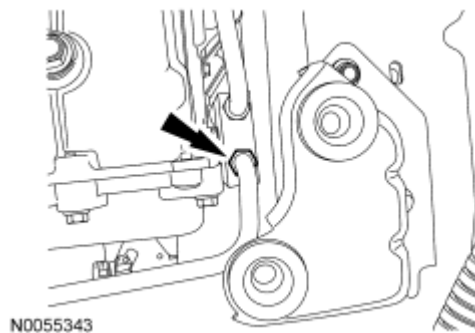
**Fig. 203: Locating Selector Lever Cable End From Manual Lever**  
Courtesy of FORD MOTOR CO.

13. Remove the nut and the manual control lever.



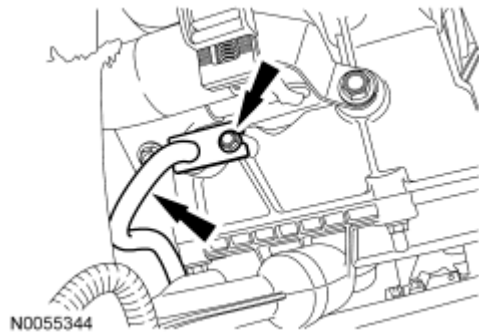
**Fig. 204: Identifying Manual Control Lever & Nut**  
Courtesy of FORD MOTOR CO.

14. Loosen the transmission fluid cooler tube fitting from the thermal bypass valve.



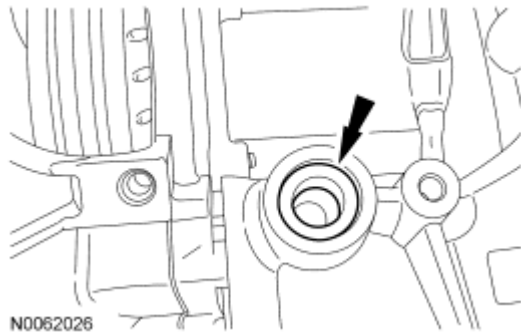
**Fig. 205: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

15. Remove and discard the transmission fluid cooler tube bolt and remove the transmission fluid cooler tube.



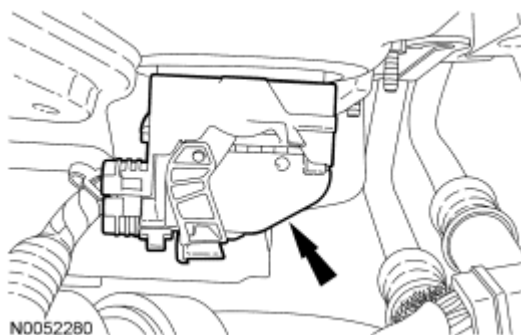
**Fig. 206: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

16. Inspect the transaxle case to make sure that the transmission fluid cooler tube seal and backing ring were removed with the transmission fluid cooler tube and are not stuck in the transaxle case. If the transmission fluid cooler tube seal or backing ring are stuck in the transaxle case, remove the seal and backing ring.



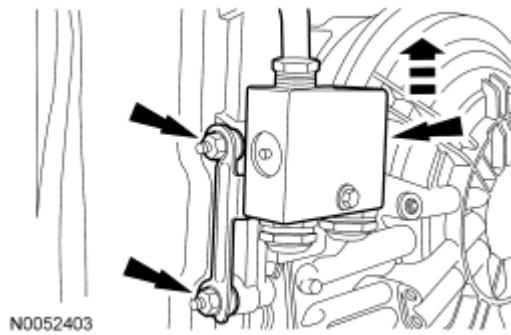
**Fig. 207: Identifying Transmission Fluid Cooler Tube Seal**  
Courtesy of FORD MOTOR CO.

17. Disconnect the transaxle electrical connector.



**Fig. 208: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

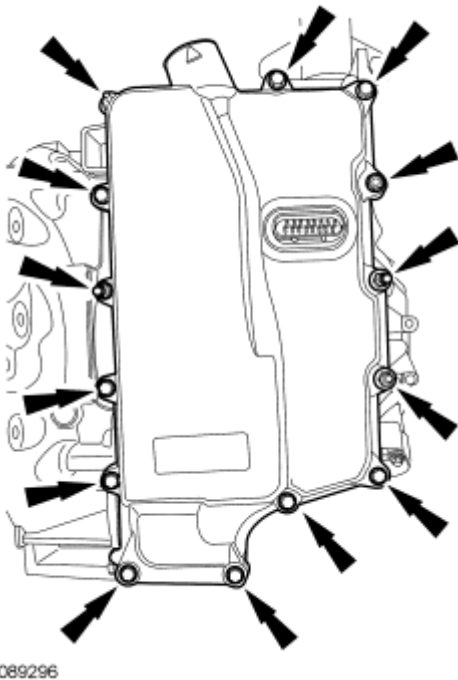
18. Remove the transmission fluid cooler tube bracket nuts, pull the transmission fluid cooler thermal bypass valve straight up and position it aside.



**Fig. 209: Removing Nuts & Pulling Transmission Fluid Cooler Thermal Bypass Valve Straight Up**  
Courtesy of FORD MOTOR CO.

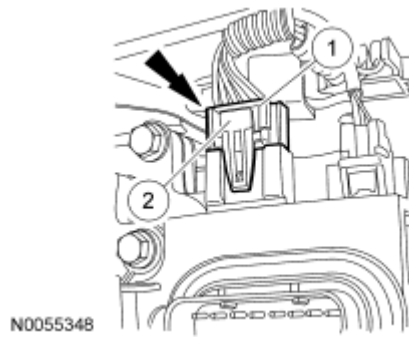
**NOTE:** Note the location of the studbolts for assembly.

19. Remove the bolts and the main control cover.



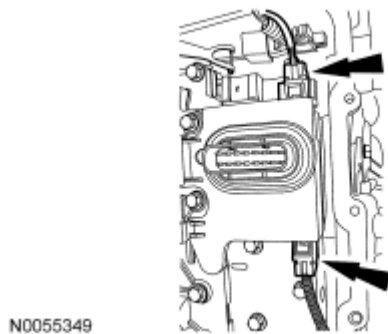
**Fig. 210: Main Control Valve Cover Bolts**  
Courtesy of FORD MOTOR CO.

20. Disconnect the Transmission Range (TR) sensor electrical connector.
  1. Slide the lock over.
  2. Press the tab and disconnect the connector.



**Fig. 211: Pressing Tab & Disconnecting Connector**  
Courtesy of FORD MOTOR CO.

21. Disconnect the Turbine Shaft Speed (TSS) and Output Shaft Speed (OSS) sensor electrical connectors.

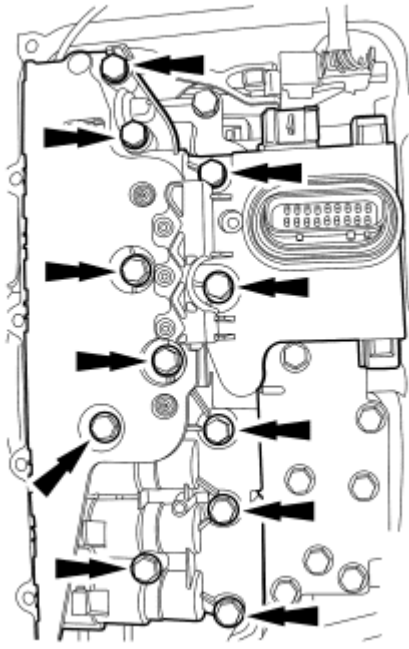


**Fig. 212: Locating Turbine Shaft Speed (TSS) & Output Shaft Speed (OSS) Sensor Electrical Connectors**  
Courtesy of FORD MOTOR CO.

**NOTE:** The solenoid body should be handled with care, damage to the solenoid body may occur.

**NOTE:** Note the location of the different length bolts for assembly.

22. Remove the bolts and the solenoid body.



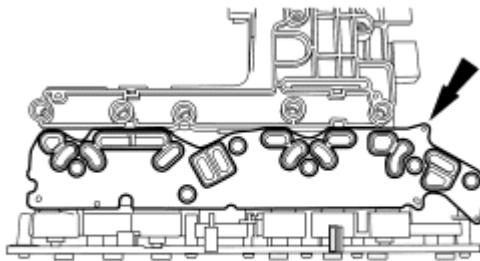
N0055350

**Fig. 213: Locating Solenoid Body Bolts**  
Courtesy of FORD MOTOR CO.

**NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.

**NOTE:** Use care not to break the alignment tabs when removing the solenoid body filter.

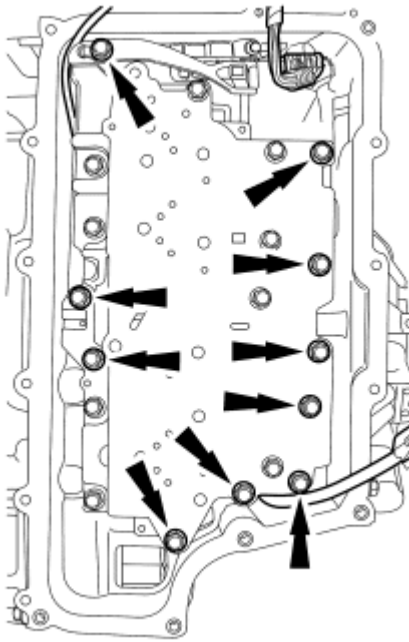
23. Remove the solenoid body filter assembly by pulling it straight up from the alignment tabs. Discard the filter.



N0055016

**Fig. 214: Identifying Solenoid Body Filter Assembly**  
Courtesy of FORD MOTOR CO.

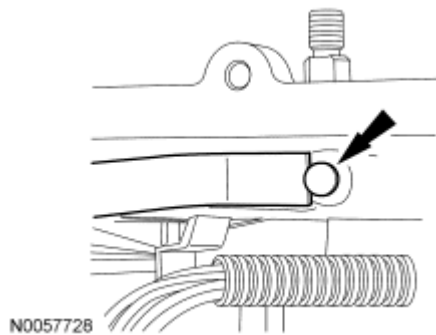
24. Remove the bolts, the TR sensor detent spring and the main control valve body.



N0057465

**Fig. 215: Locating Main Control Valve Body Bolts**  
Courtesy of FORD MOTOR CO.

25. Using a suitable tool, remove and discard the TR sensor locking pin.

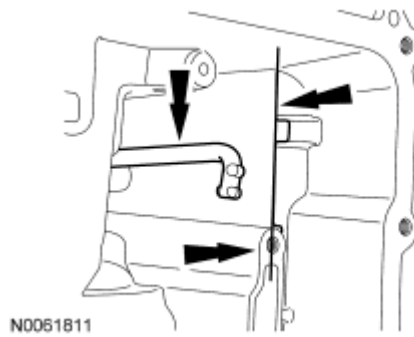


N0057728

**Fig. 216: Locating TR Sensor Locking Pin**  
Courtesy of FORD MOTOR CO.

**NOTE:** TR sensor removed for clarity.

26. Make sure that the park pawl actuator rod does not become disengaged from the park pawl and the abutment by keeping the end of the park pawl actuator rod behind the machined valve body mating surface of the transaxle case. If the park pawl actuator rod becomes disengaged from the park pawl and the abutment, transaxle removal and disassembly is required to reinstall the actuator rod.



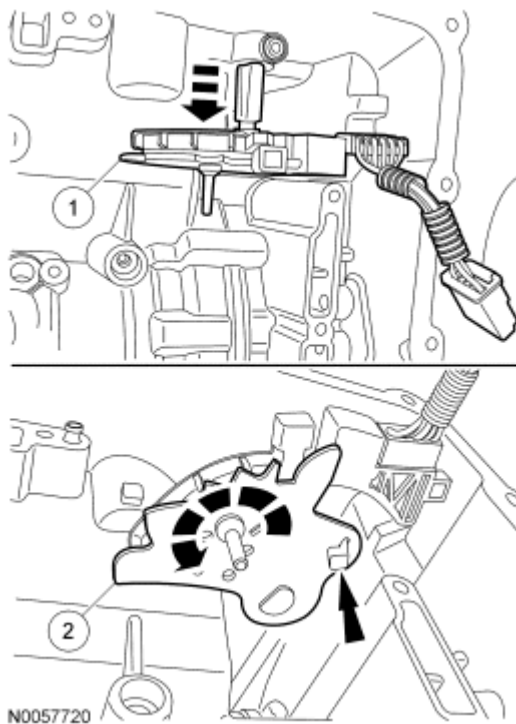
**Fig. 217: Making Sure That Park Pawl Actuator Rod Does Not Become Disengaged From Park Pawl**

Courtesy of FORD MOTOR CO.

**NOTE:** Make sure that the park pawl actuator rod does not become disengaged from the park pawl and the abutment or transaxle removal and disassembly is required to reinstall the actuator rod.

27. Remove the TR sensor.

1. Slide the TR sensor down until the manual shaft is out of the transaxle case.
2. Rotate the TR sensor detent plate counterclockwise, as viewed from below, until the plate rests against the transaxle case. Remove the park pawl actuating rod from the TR sensor and remove the TR sensor.



**Fig. 218: Sliding TR Sensor Down & Rotating TR Sensor Detent Plate Counterclockwise**

Courtesy of FORD MOTOR CO.

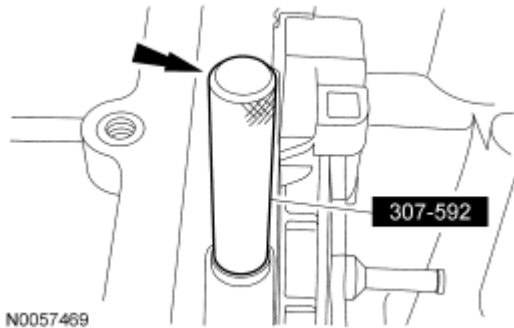
**INSTALLATION**

1. Install the TR sensor.
  1. Position the park pawl actuating rod in the TR sensor.
  2. Install the TR sensor in the transaxle case.



**Fig. 219: Identifying TR Sensor In Transaxle Case**  
Courtesy of FORD MOTOR CO.

2. Using the Manual Retaining Pin Installer, install a new TR sensor locking pin.

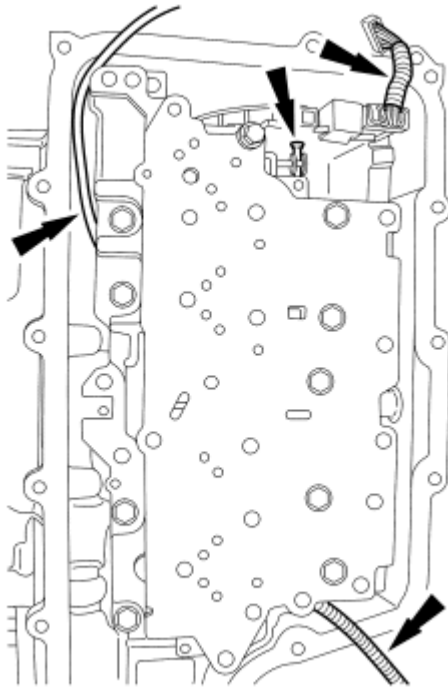


**Fig. 220: Installing TR Sensor Locking Pin Using Special Tool (307-592)**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure that the manual pin (part of the TR sensor) is correctly installed in the manual valve.

3. Position the TSS, OSS and TR sensor wiring harnesses aside and install the main control valve body.

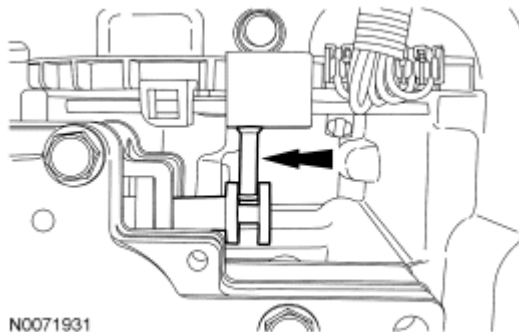




N0071929

**Fig. 221: Locating TSS, OSS & TR Sensor Wiring Harnesses**  
Courtesy of FORD MOTOR CO.

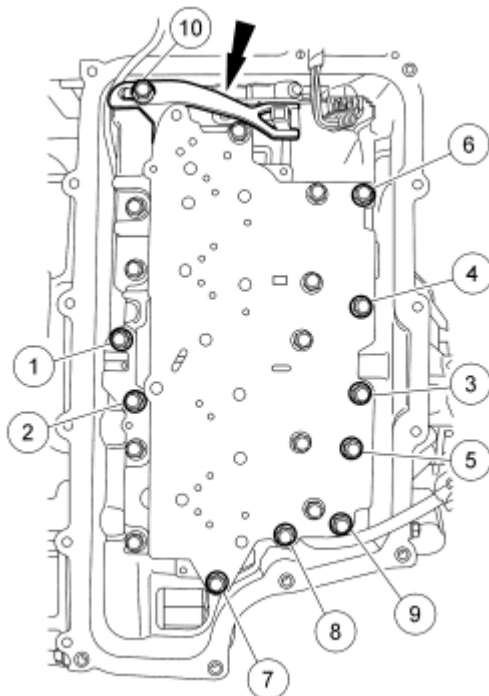
4. Inspect the manual pin to make sure it is correctly installed in the manual control valve. If it is not, pull the valve body off the transaxle case. Correctly install the manual pin in the manual control valve and position the valve body in place.



N0071931

**Fig. 222: Identifying Manual Pin**  
Courtesy of FORD MOTOR CO.

5. Install the TR sensor detent spring and the bolts. Tighten the bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).

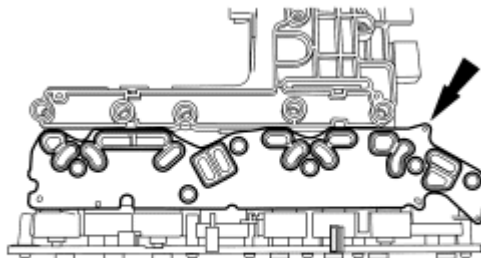


N0071930

**Fig. 223: Tightening TR Sensor Detent Spring Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

- NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.
- NOTE:** Use care not to break the alignment tabs when installing the solenoid body filter. Damage to the transaxle will occur if the solenoid body is not correctly aligned.
- NOTE:** Make sure that the filter passage areas are clean of foreign material before installing the filter. Damage to the transaxle will occur if the filter passages are not clean.

6. Install a new solenoid body filter assembly by pushing it straight down on to the alignment tabs.



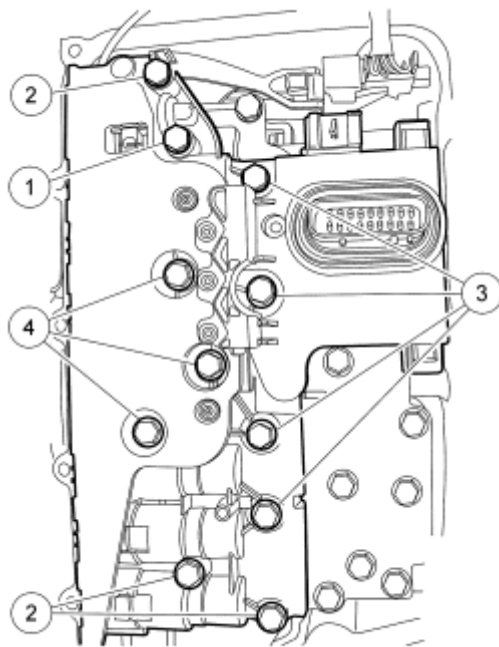
N0055016

**Fig. 224: Identifying Solenoid Body Filter Assembly**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure not to pinch the Turbine Shaft Speed (TSS), Output Shaft Speed (OSS) or Transmission Range (TR) sensor wiring harnesses when installing the solenoid body. Damage to the wiring harness will occur.

**NOTE:** Install the different length bolts in the locations noted during disassembly.

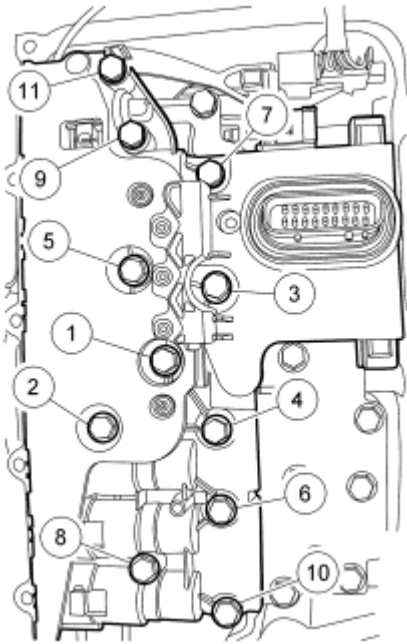
7. Install the solenoid body and the bolts.
  1. 42 mm (1.65 in) bolt
  2. 63 mm (2.48 in) bolts
  3. 80 mm (3.14 in) bolts
  4. 95 mm (3.74 in) bolts



N0057462

**Fig. 225: Locating Solenoid Body Bolts**  
Courtesy of FORD MOTOR CO.

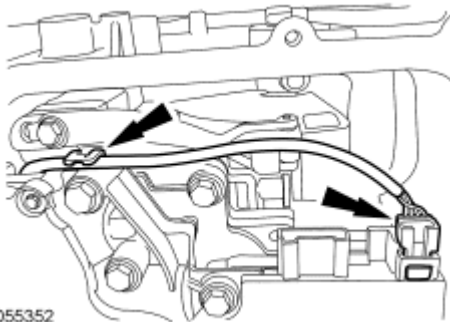
8. Tighten the solenoid body bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).



N0055351

**Fig. 226: Tightening Solenoid Body Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

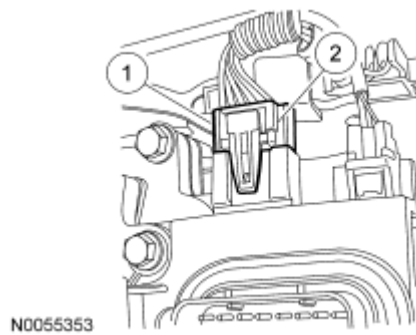
9. Route the OSS sensor wiring harness and connect the electrical connector.



N0055352

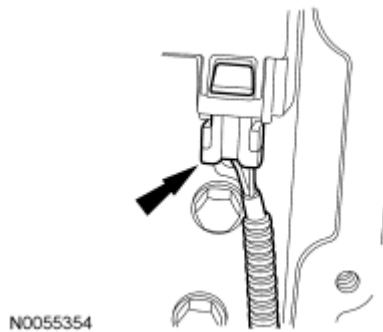
**Fig. 227: Locating OSS Sensor Wiring Harness & Electrical Connector**  
Courtesy of FORD MOTOR CO.

10. Connect the TR sensor electrical connector.
  1. Connect the electrical connector.
  2. Slide the locking tab over.



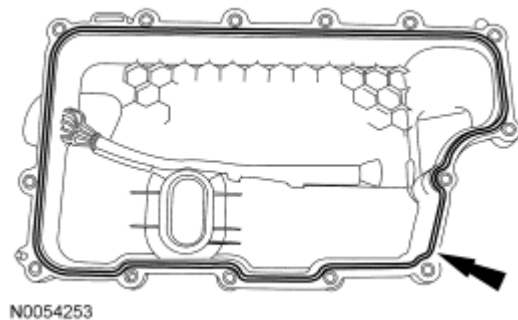
**Fig. 228: Identifying TR Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

11. Connect the TSS sensor electrical connector.



**Fig. 229: Identifying TSS Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

12. Inspect the transaxle main control cover seal for damage and install new if necessary.



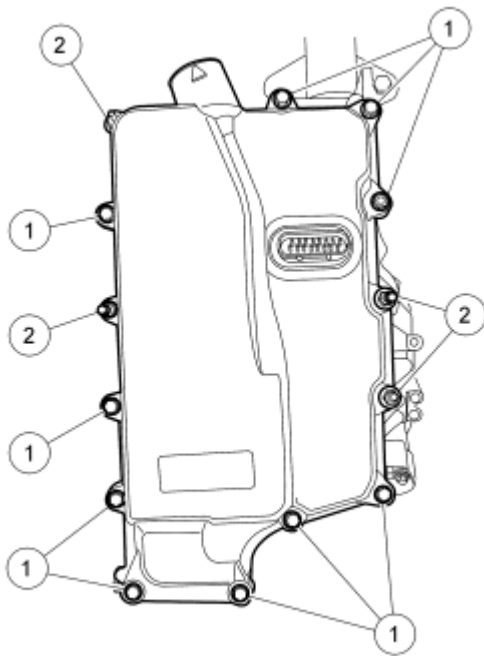
**Fig. 230: Inspecting Transaxle Main Control Cover Seal For Damage**  
Courtesy of FORD MOTOR CO.

**NOTE:** Inspect the 20-pin solenoid body connector seal to make sure that the seal is on the inside of the main control cover or a transmission fluid leak will occur resulting in transmission damage.

**NOTE:** Install the studbolts in the locations noted during disassembly.

13. Install the main control cover and loosely install the bolts.

1. Bolt location
2. Studbolt location

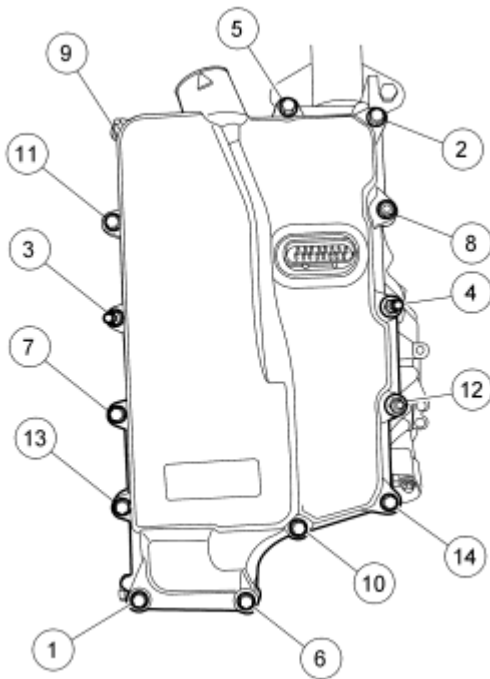


N0089295

**Fig. 231: Main Control Cover Bolts**  
Courtesy of FORD MOTOR CO.

14. Tighten the main control cover bolts in the sequence shown.

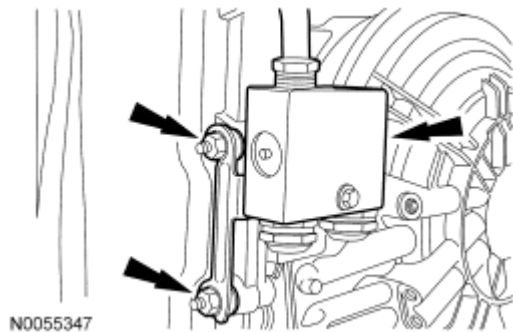
- Tighten to 12 Nm (106 lb-in).



N0089294

**Fig. 232: Main Control Cover Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

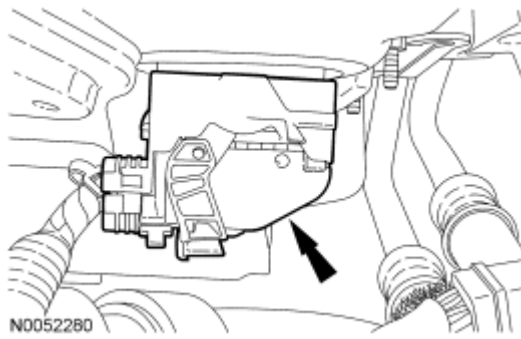
15. Position the transmission fluid cooler thermal bypass valve and transmission fluid cooler tube assembly in place and install the nuts.
- Tighten to 9 Nm (80 lb-in).



N0055347

**Fig. 233: Identifying Transmission Fluid Cooler Tube Assembly & Nuts**  
Courtesy of FORD MOTOR CO.

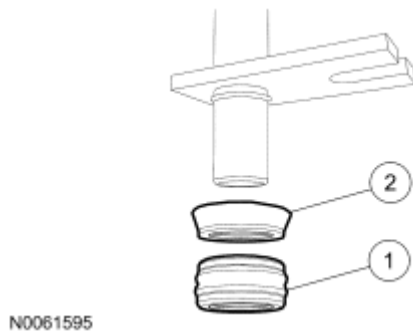
16. Connect the transaxle electrical connector.



**Fig. 234: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

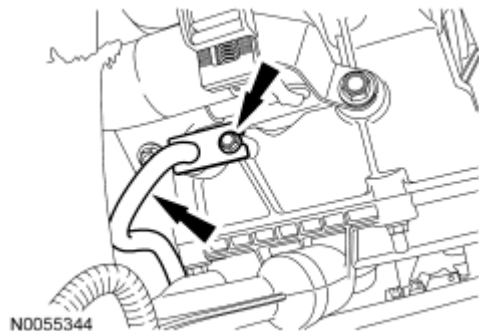
17. Inspect the transmission fluid cooler tube backing ring and seal for damage and install a new backing ring or seal if necessary. Lubricate the transmission fluid cooler tube seal with clean transmission fluid and install the backing ring and seal on the transmission fluid cooler tube.

Item	Part Number	Description
1	7D285	Seal
2	7J324	Backing ring



**Fig. 235: Identifying Transmission Fluid Cooler Tube Backing Ring & Seal**  
Courtesy of FORD MOTOR CO.

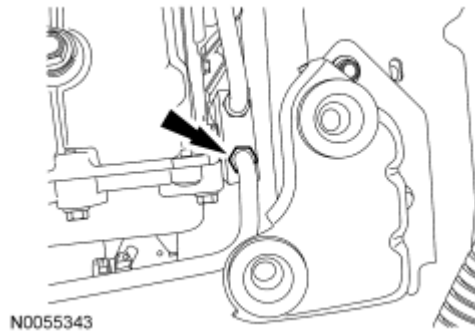
18. Position the transmission fluid cooler tube in place and install a new bolt.
  - Tighten to 9 Nm (80 lb-in).





**Fig. 236: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

19. Tighten the transmission fluid cooler tube fitting.
  - Tighten to 25 Nm (18 lb-ft).

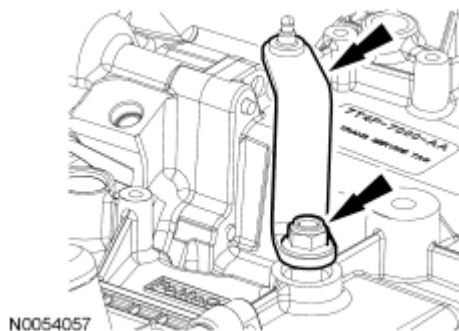


**Fig. 237: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure that when installing the manual control lever it is fully seated onto the manual control lever shaft. Damage to the manual control lever shaft will occur and the lever will come loose.

**NOTE:** Make sure to hold the manual control lever while tightening the manual control lever nut or damage to the manual control lever and park components will occur.

20. Install the manual control lever and the nut.
  - Tighten to 18 Nm (159 lb-in).



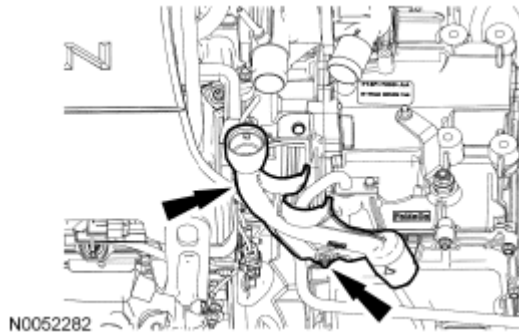
**Fig. 238: Identifying Manual Control Lever & Nut**  
Courtesy of FORD MOTOR CO.

21. Connect the selector lever cable end to the manual control lever.



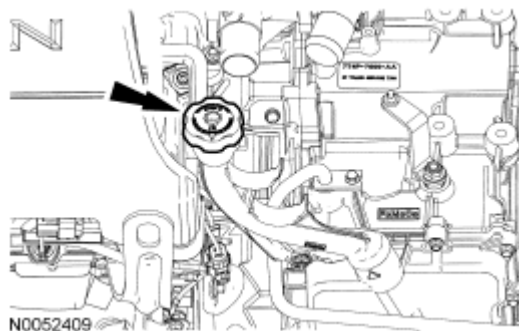
**Fig. 239: Locating Selector Lever Cable End From Manual Lever**  
Courtesy of FORD MOTOR CO.

22. Install the transmission fluid filler tube and the nut.
  - Tighten to 11 Nm (97 lb-in).



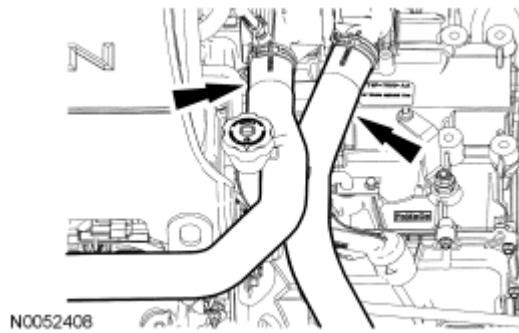
**Fig. 240: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

23. Install the transmission fluid level indicator.



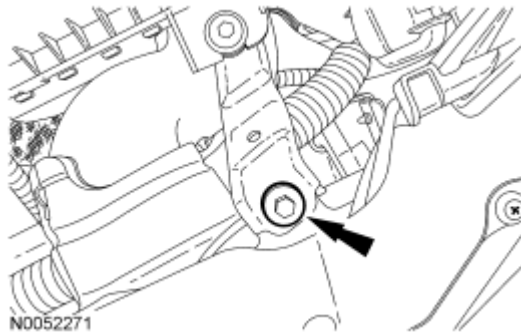
**Fig. 241: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

24. Route the coolant hoses to the correct position on the transmission fluid filler tube.



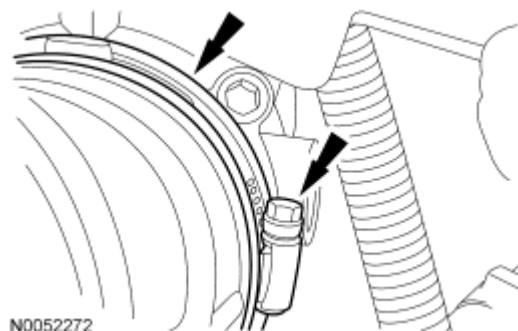
**Fig. 242: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

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



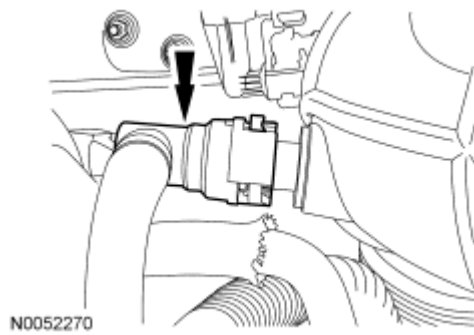
**Fig. 243: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

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



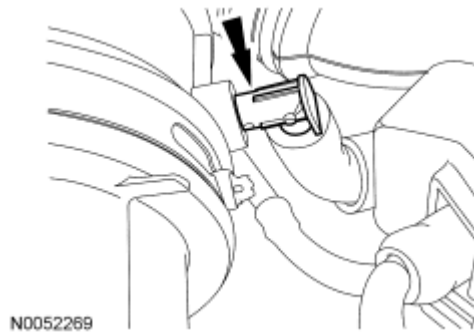
**Fig. 244: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

27. Connect the engine breather to the ACL assembly.



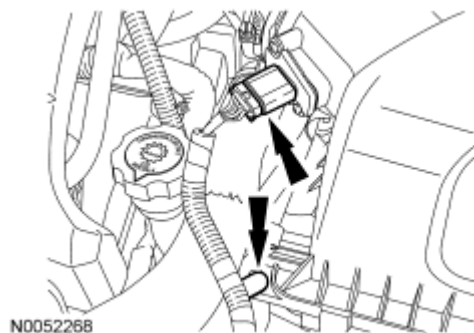
**Fig. 245: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

28. Connect the brake booster vacuum hose to the ACL assembly.



**Fig. 246: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

29. Connect the MAF sensor electrical connector and connect the electrical harness fastener.



**Fig. 247: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

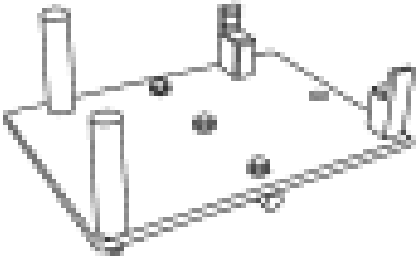
30. Fill with clean transmission fluid to the correct level.

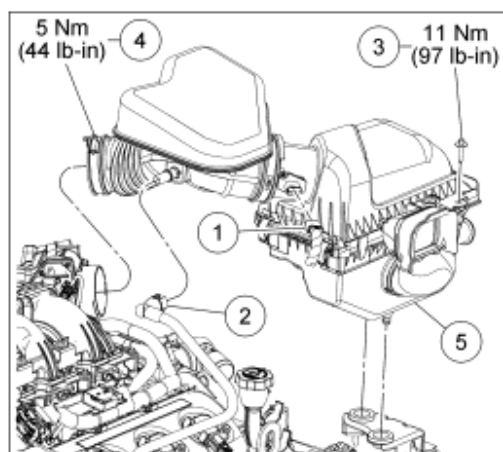
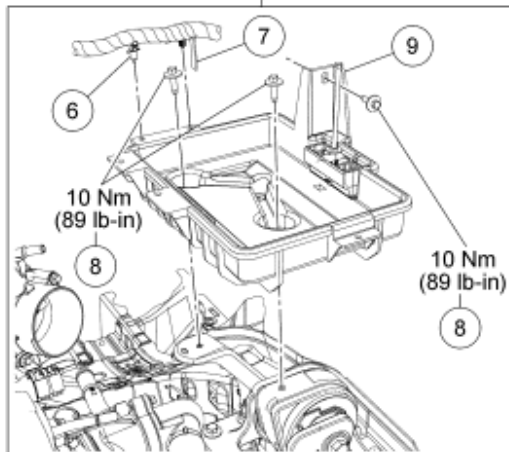
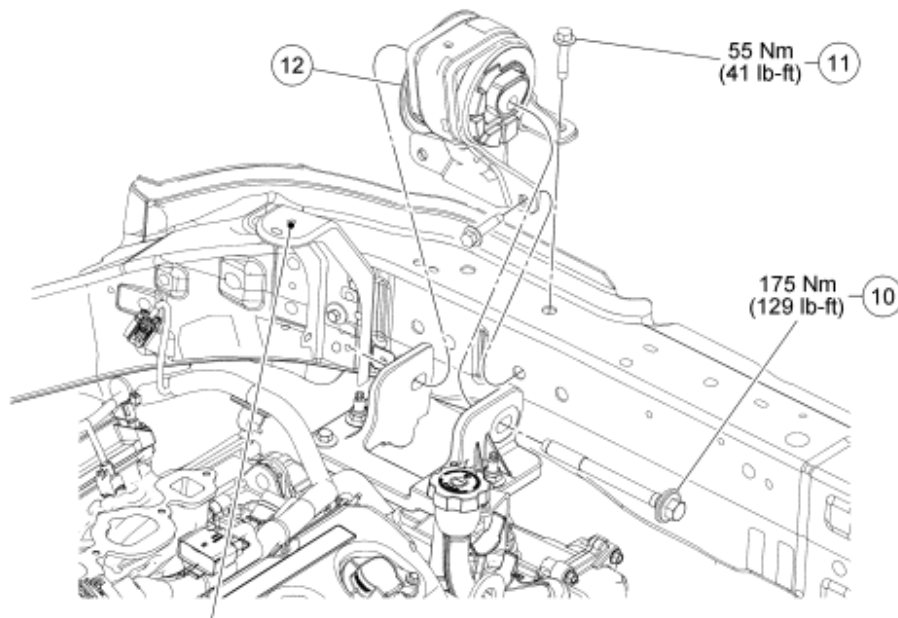
## TRANSAXLE SUPPORT INSULATOR

### Special Tools

## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

Illustration	Tool Name	Tool Number
 <b>ST3034-A</b>	Oil Pan Holding Fixture	303-1295



N0091299

**Fig. 248: Replacing Transaxle Support Insulator**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	14A464	Electrical connector - Mass Air Flow (MAF) sensor
2	6758	Tube assembly - crankcase vent
3	N606678	Bolt - Air Cleaner (ACL) bracket
4	9C632	Clamp - ACL outlet pipe
5	9C662	ACL assembly
6	13A506	Fastener - wiring harness
7	13A506	Fastener - wiring harness
8	W503924	Bolts - battery tray
9	10723	Battery tray
10	W711873	Through bolt - transaxle support insulator
11	W709234	Bolt - transaxle support insulator (4 required)
12	6F020	Transaxle support insulator

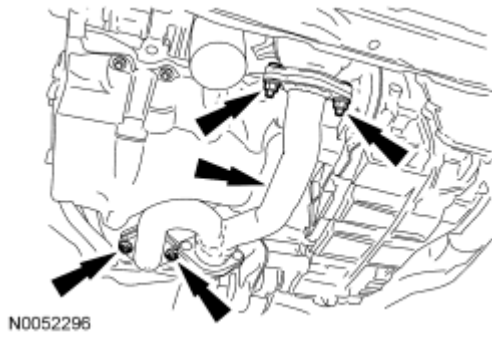
## REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.
2. Loosen the exhaust flexible pipe clamp and disconnect the 2 exhaust hangers.



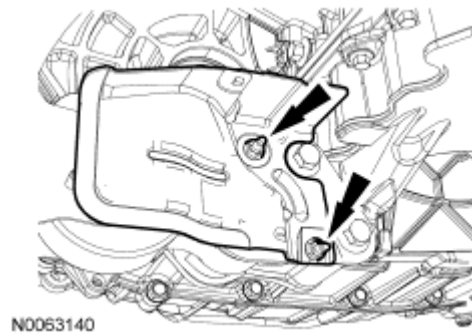
**Fig. 249: Locating Exhaust Flexible Pipe Clamp & Exhaust Hangers**  
Courtesy of FORD MOTOR CO.

3. Remove the 4 nuts and the exhaust flexible pipe and Y-pipe as an assembly.
  - Discard the nuts and the gasket.



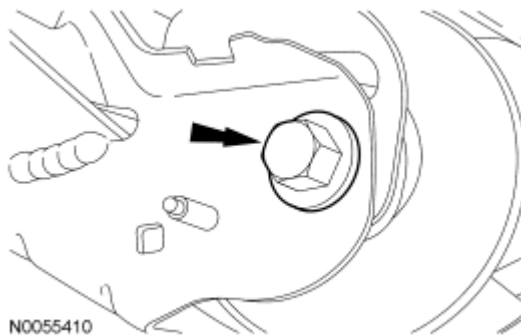
**Fig. 250: Locating Exhaust Flexible Pipe, Y-Pipe & Nuts**  
Courtesy of FORD MOTOR CO.

4. Remove the 2 nuts and the roll restrictor heat shield.



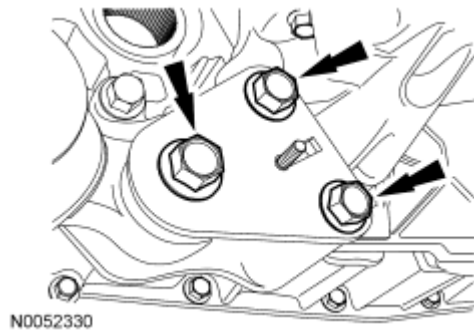
**Fig. 251: Locating Roll Restrictor Heat Shield Nuts**  
Courtesy of FORD MOTOR CO.

5. Loosen the engine roll restrictor-to-subframe through bolt.



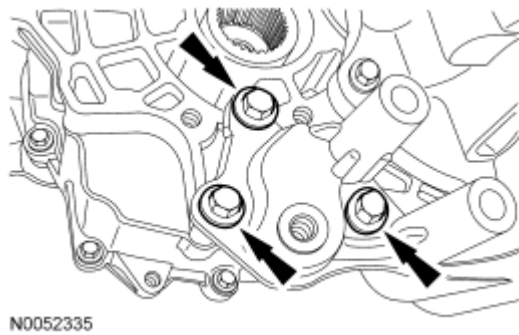
**Fig. 252: Locating Roll Restrictor-To-Subframe Bolt**  
Courtesy of FORD MOTOR CO.

6. Remove the 3 bolts from the roll restrictor bracket.



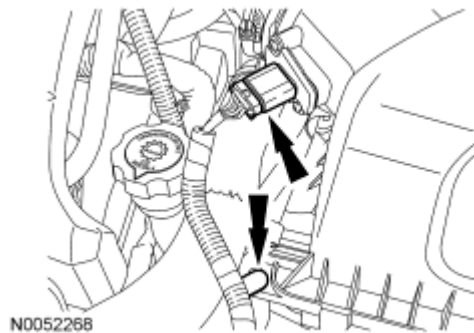
**Fig. 253: Locating Roll Restrictor-To-Transaxle Bracket Plate Bolts**  
Courtesy of FORD MOTOR CO.

7. Remove the 3 bolts and the roll restrictor bracket.



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

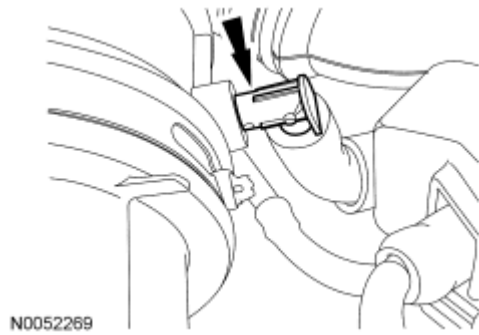
8. Disconnect the Mass Air Flow (MAF) sensor electrical connector and the wiring harness fastener from the Air Cleaner (ACL) assembly.



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

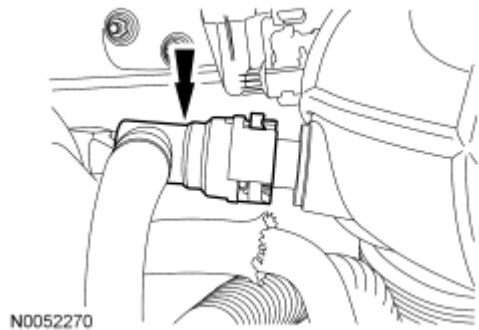
9. Disconnect the brake booster vacuum hose from the ACL outlet pipe.





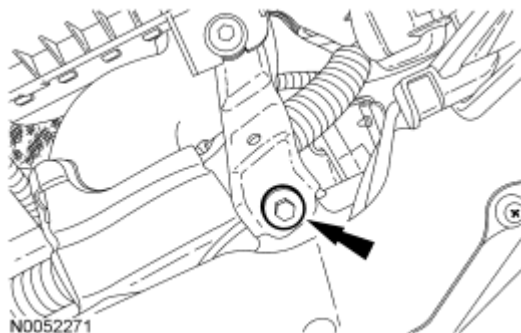
**Fig. 256: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

10. Disconnect the engine breather from the ACL assembly.



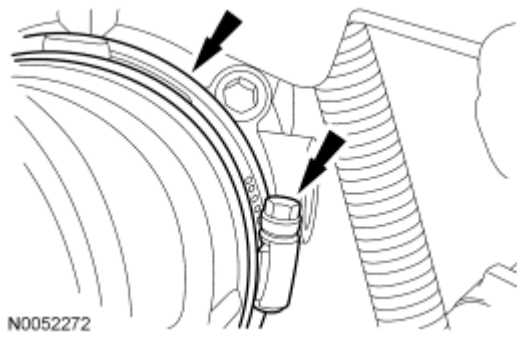
**Fig. 257: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

11. Remove the ACL assembly bracket bolt.



**Fig. 258: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

12. Loosen the ACL outlet pipe clamp at the Throttle Body (TB) and remove the ACL and ACL outlet pipe assembly.



**Fig. 259: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

13. Remove the battery. For additional information, refer to **BATTERY, MOUNTING & CABLES** article.
14. Remove the battery tray.
  1. Disconnect the wiring harness fasteners.
  2. Remove the 3 bolts and the battery tray.

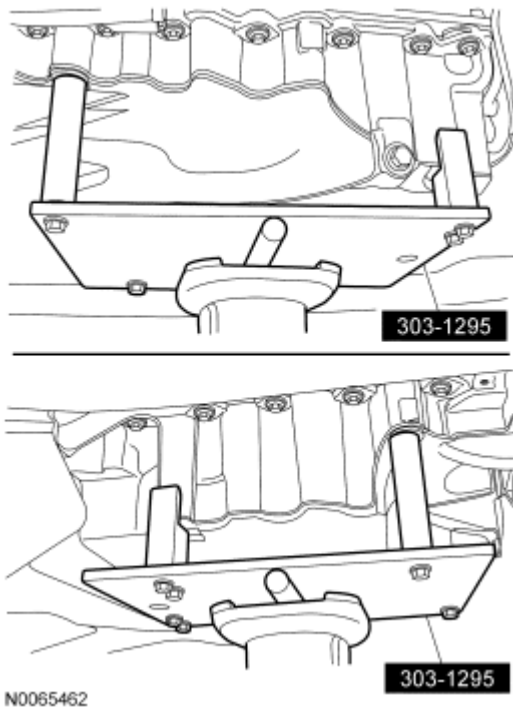


**Fig. 260: Identifying Wiring Harness Fasteners, Battery Tray & Bolts**  
Courtesy of FORD MOTOR CO.

**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.

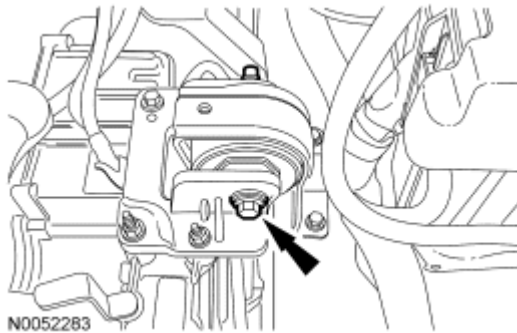
**NOTE:** The Oil Pan Holding Fixture and floor jack are used to raise and lower the engine to access the engine front cover and engine mount bracket fasteners.

15. Position a floor jack and the Oil Pan Holding Fixture under the oil pan and raise the floor jack high enough to release the pressure on the transaxle support insulator.



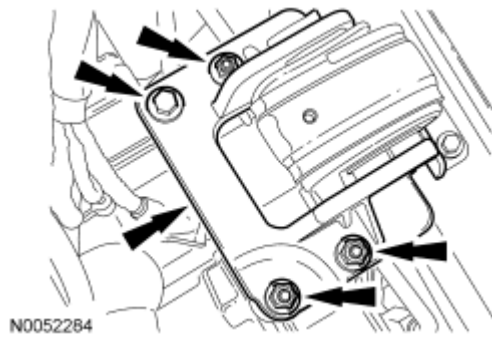
**Fig. 261: Positioning Floor Jack & Special Tool (303-1295) Under Oil Pan**  
Courtesy of FORD MOTOR CO.

16. Remove the transaxle support insulator through bolt.



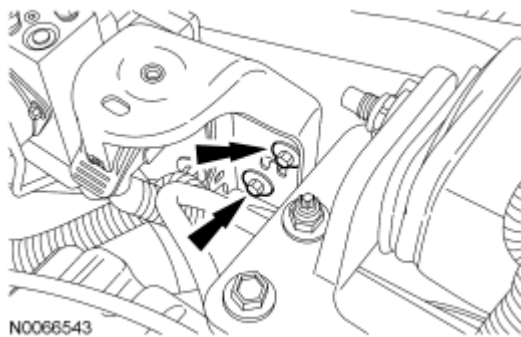
**Fig. 262: Identifying Transaxle Support Insulator Bolt**  
Courtesy of FORD MOTOR CO.

17. Remove the 3 nuts, the bolt and the transaxle support insulator bracket.



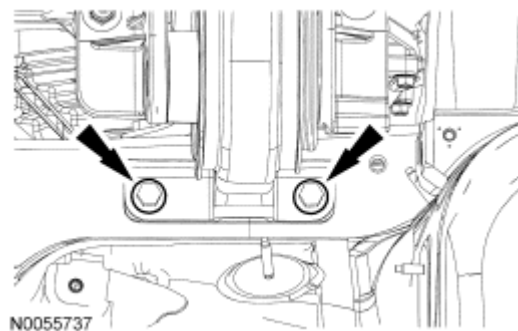
**Fig. 263: Identifying Transaxle Support Insulator Bracket, Nuts & Bolts**  
Courtesy of FORD MOTOR CO.

18. Lower the jack until the transmission fluid cooler tube clears the lower transmission support insulator bolts.
19. Loosen the battery tray support bracket bolts.



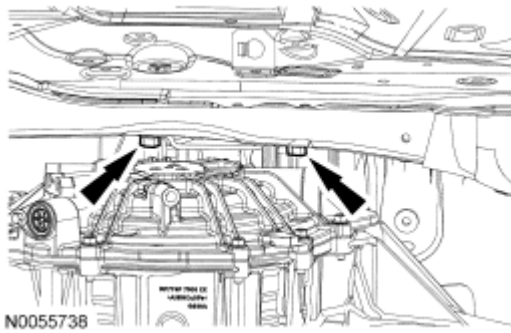
**Fig. 264: Identifying Battery Tray Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

20. Remove the top transaxle support insulator bolts.



**Fig. 265: Identifying Top Transaxle Support Insulator Bolts**  
Courtesy of FORD MOTOR CO.

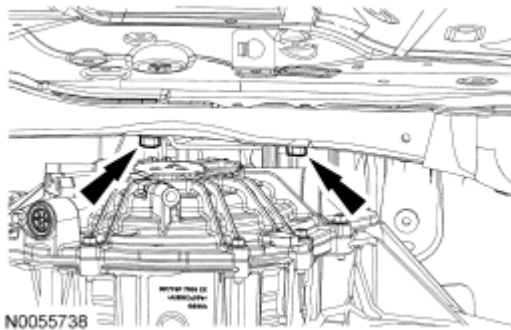
21. Remove the bottom transaxle support insulator bolts.



**Fig. 266: Identifying Bottom Transaxle Support Insulator Bolts**  
Courtesy of FORD MOTOR CO.

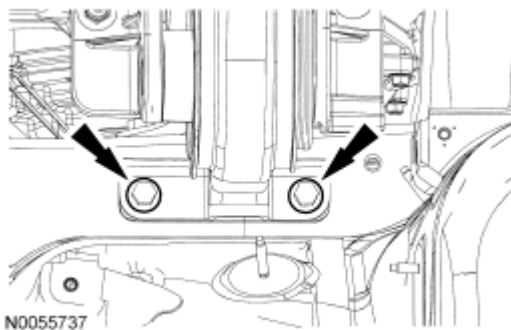
## INSTALLATION

1. Install the bottom transaxle support insulator bolts.
  - Tighten to 55 Nm (41 lb-ft).



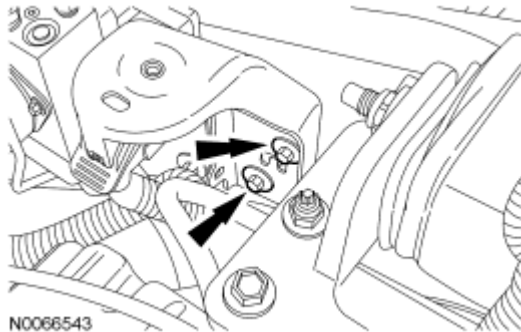
**Fig. 267: Identifying Bottom Transaxle Support Insulator Bolts**  
Courtesy of FORD MOTOR CO.

2. Install the top transaxle support insulator bolts.
  - Tighten to 55 Nm (41 lb-ft).



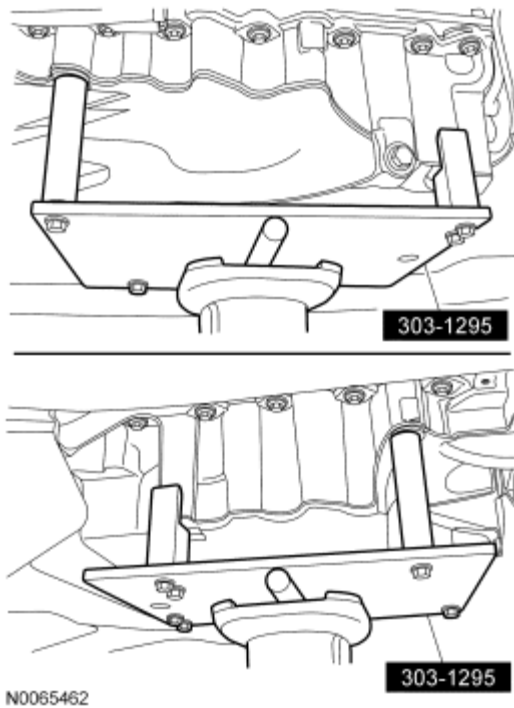
**Fig. 268: Identifying Top Transaxle Support Insulator Bolts**  
Courtesy of FORD MOTOR CO.

3. Tighten the battery tray support bracket bolts.
  - Tighten to 10 Nm (89 lb-in).



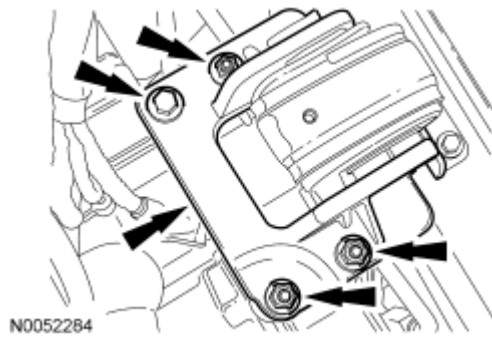
**Fig. 269: Identifying Battery Tray Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

4. Using the jack and the Oil Pan Holding Fixture, lift the transaxle into place.



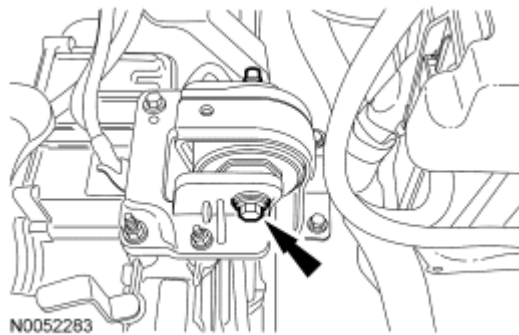
**Fig. 270: Positioning Floor Jack & Special Tool (303-1295) Under Oil Pan**  
Courtesy of FORD MOTOR CO.

5. Install the transaxle support insulator bracket, bolt and the 3 nuts.
  - Tighten the transaxle support insulator bracket nuts to 63 Nm (46 lb-ft).
  - Tighten the transaxle support insulator bracket bolt to 63 Nm (46 lb-ft).



**Fig. 271: Identifying Transaxle Support Insulator Bracket, Nuts & Bolts**  
Courtesy of FORD MOTOR CO.

6. Install the transaxle support insulator through bolt.
  - Tighten to 175 Nm (129 lb-ft).



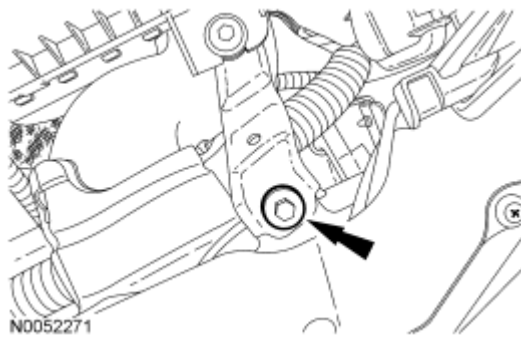
**Fig. 272: Identifying Transaxle Support Insulator Bolt**  
Courtesy of FORD MOTOR CO.

7. Install the battery tray.
  1. Install the 3 bolts.
    - Tighten to 10 Nm (89 lb-in).
  2. Connect the wiring harness fasteners to the battery tray.



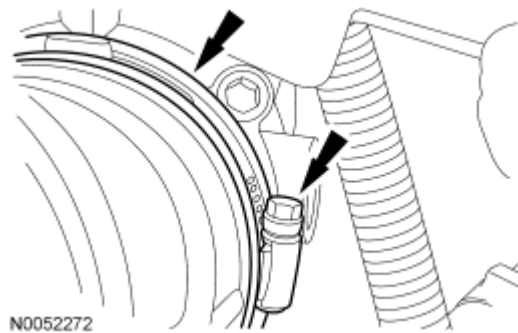
**Fig. 273: Identifying Wiring Harness Fasteners, Battery Tray & Bolts**  
Courtesy of FORD MOTOR CO.

8. Install the battery. For additional information, refer to **BATTERY, MOUNTING & CABLES** article.
9. Position the ACL assembly in place and install the bolt.
  - Tighten to 11 Nm (97 lb-in).



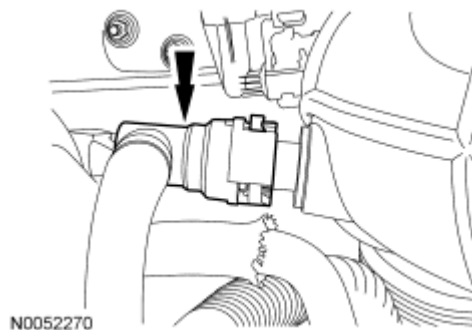
**Fig. 274: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

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



**Fig. 275: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

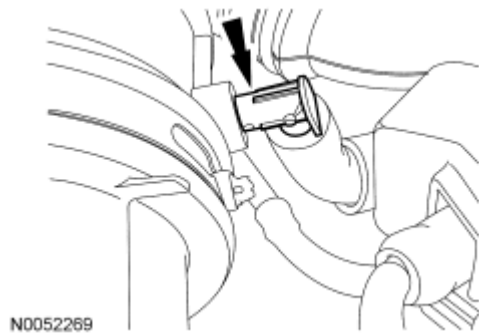
11. Connect the engine breather to the ACL assembly.



**Fig. 276: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

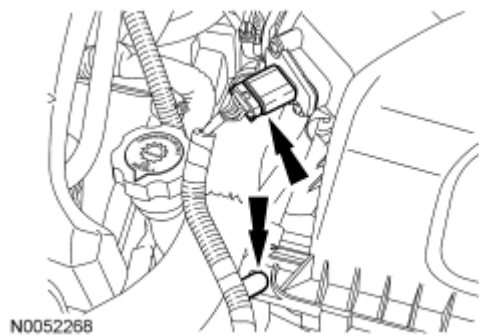


12. Connect the brake booster vacuum hose to the ACL assembly.



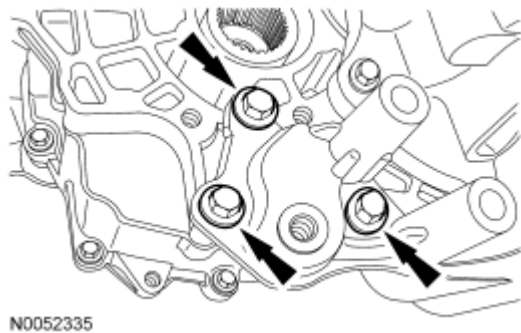
**Fig. 277: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

13. Connect the MAF sensor electrical connector and connect the electrical harness fastener.



**Fig. 278: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

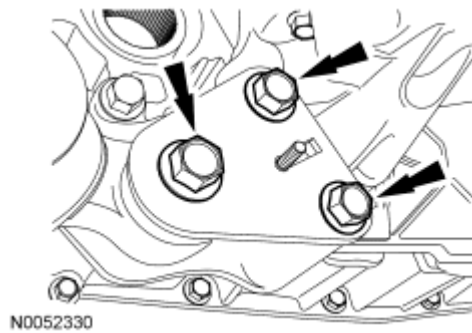
14. Position the roll restrictor bracket on the transaxle and install the 3 bolts.
- Tighten to 90 Nm (66 lb-ft).



**Fig. 279: Locating Transaxle Bracket Bolts**  
Courtesy of FORD MOTOR CO.

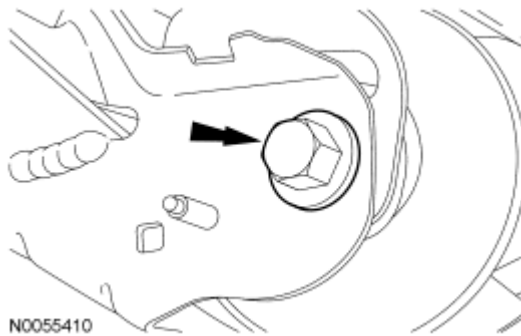
15. Position the roll restrictor in place, install the bracket and the 3 bolts.

- Tighten to 90 Nm (66 lb-ft).



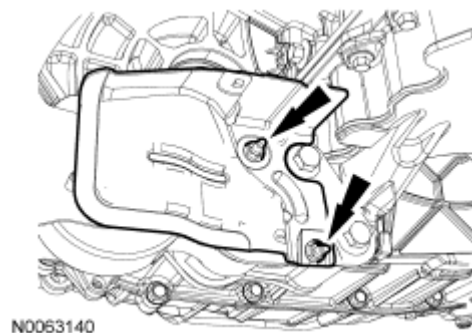
**Fig. 280: Locating Roll Restrictor-To-Transaxle Bracket Plate Bolts**  
Courtesy of FORD MOTOR CO.

16. Install the engine roll restrictor-to-subframe through bolt.
  - Tighten to 103 Nm (76 lb-ft).



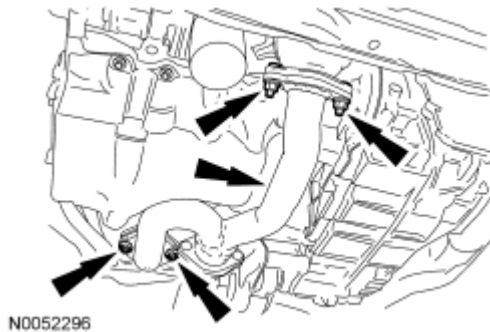
**Fig. 281: Locating Roll Restrictor-To-Subframe Bolt**  
Courtesy of FORD MOTOR CO.

17. Install the roll restrictor heat shield and the 2 nuts.
  - Tighten to 11 Nm (97 lb-in).



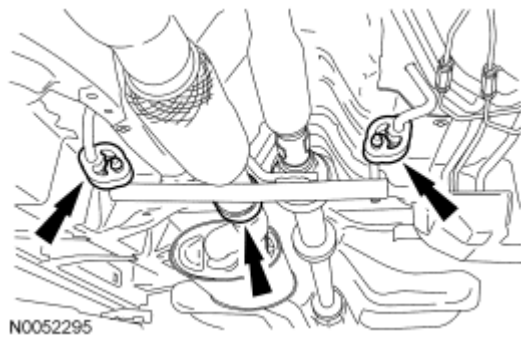
**Fig. 282: Locating Roll Restrictor Heat Shield Nuts**  
Courtesy of FORD MOTOR CO.

18. Position the exhaust Y-pipe assembly in place and install a new gasket and 4 new nuts.
- Tighten to 40 Nm (30 lb-ft).



**Fig. 283: Locating Exhaust Flexible Pipe, Y-Pipe & Nuts**  
Courtesy of FORD MOTOR CO.

19. Install the 2 exhaust hangers and tighten the exhaust clamp.
- Tighten to 40 Nm (30 lb-ft).



**Fig. 284: Locating Exhaust Flexible Pipe Clamp & Exhaust Hangers**  
Courtesy of FORD MOTOR CO.

20. Check the transmission fluid level and fill with clean transmission fluid to the correct level.

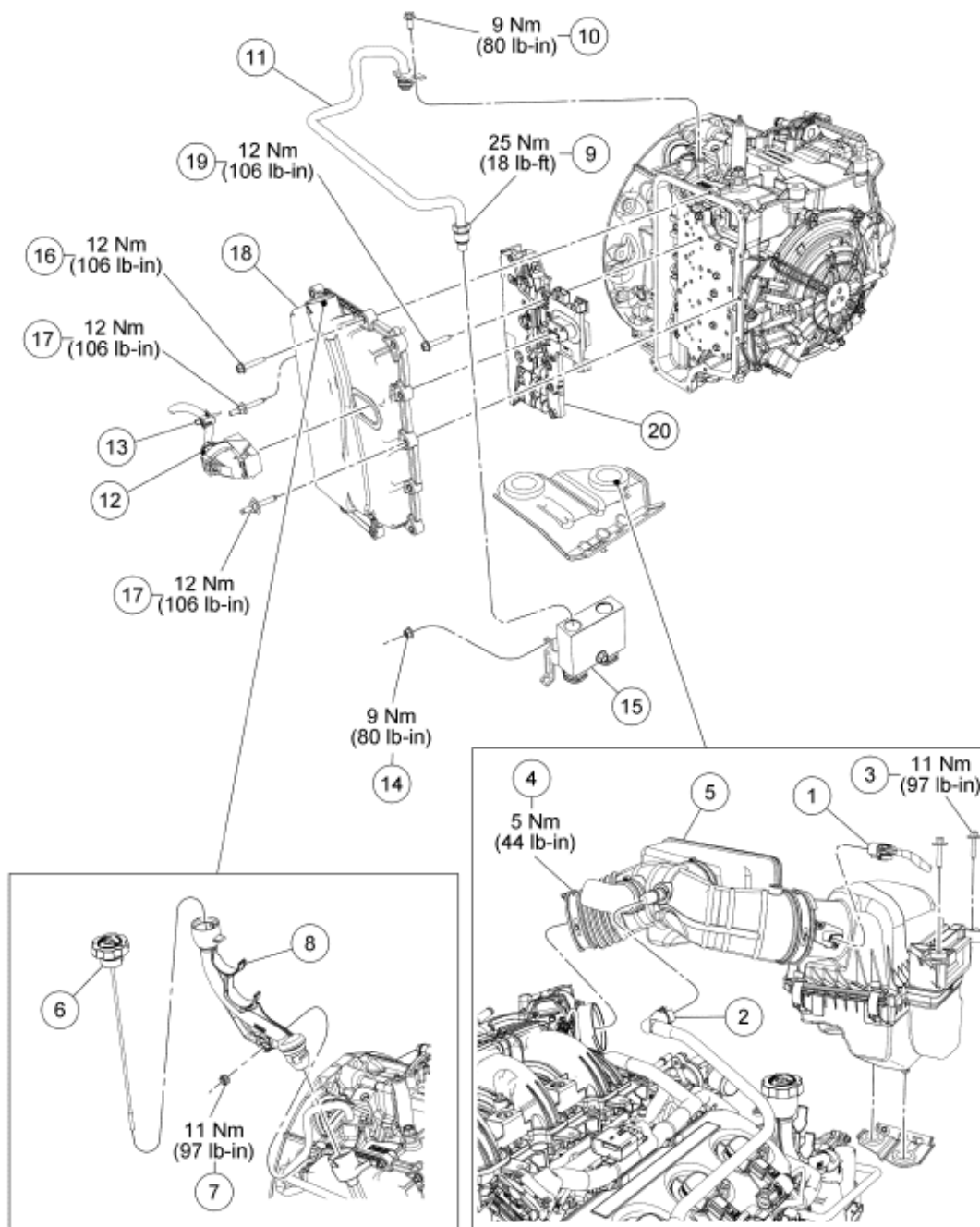
## SOLENOID BODY ASSEMBLY

### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX



N0089293

**Fig. 285: Main Control & Solenoid Body Components (With Torque Specifications)**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	14A464	Electrical connector - Mass Air Flow (MAF) sensor
2	6758	Tube assembly - crankcase vent

## 2008 Ford Edge SE

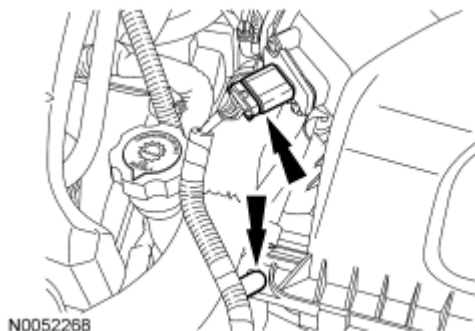
2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

3	N606678	Bolt - Air Cleaner (ACL) bracket
4	9C632	Clamp - ACL outlet pipe
5	9C662	ACL assembly
6	7A020	Transmission fluid level indicator
7	W520101	Transmission fluid filler tube nut
8	7A228	Transmission fluid filler tube
9	-	Nut - transmission fluid cooler tube (part of 7H420)
10	W711538	Bolt - transmission fluid cooler tube-to-transaxle
11	7H420	Tube - transmission fluid cooler
12	7A488	Connector - transaxle harness
13	14A169	Retainer - transaxle harness
14	W520101	Nut - bypass valve
15	7H322	Valve - transaxle fluid cooler bypass
16	7J289	Bolt - solenoid body cover (11 required)
17	W708442	Studbolt - solenoid body cover (3 required)
18	7G004	Cover - solenoid body
19	7J291	Bolt - solenoid body
20	7Z369	Solenoid body

### REMOVAL

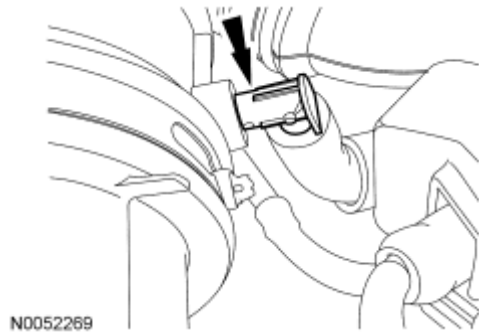
**NOTE:** The PCM must be updated with a new solenoid body strategy data file and solenoid body identification anytime a new solenoid body is installed. A new solenoid body service tag must be installed over the current solenoid body service tag on top of the transaxle case.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.
2. Disconnect the Mass Air Flow (MAF) sensor electrical connector and the wiring harness fastener from the Air Cleaner (ACL) assembly.



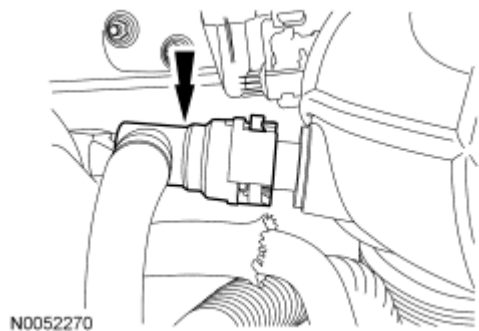
**Fig. 286: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

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



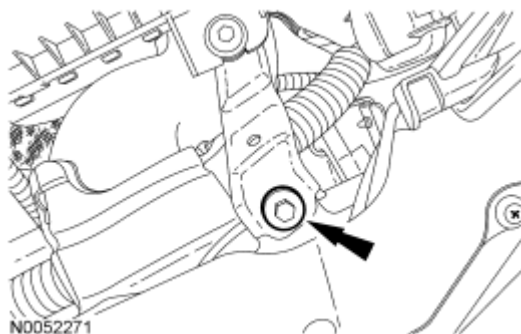
**Fig. 287: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

4. Disconnect the engine breather from the ACL assembly.



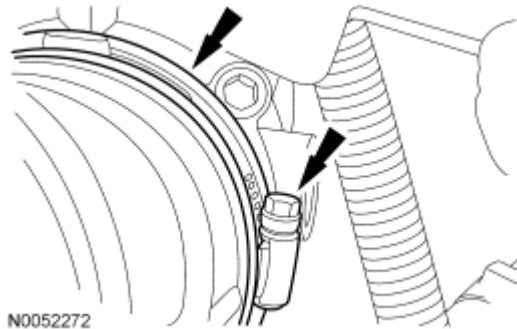
**Fig. 288: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

5. Remove the ACL assembly bracket bolt.



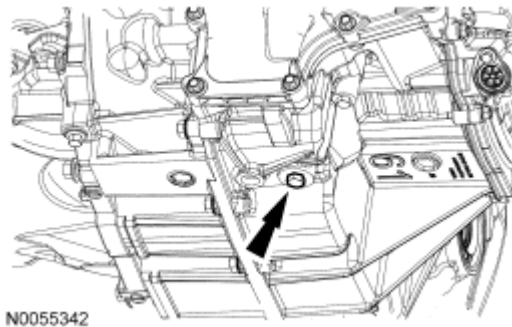
**Fig. 289: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

6. Loosen the ACL outlet pipe clamp at the Throttle Body (TB) and remove the ACL and ACL outlet pipe assembly.



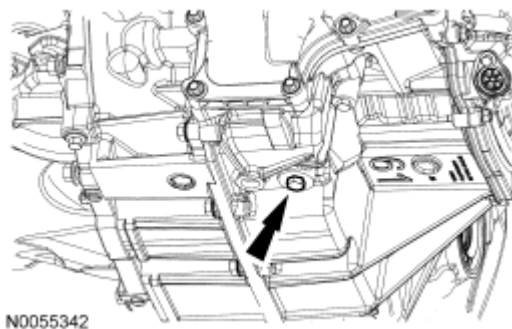
**Fig. 290: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

7. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



**Fig. 291: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

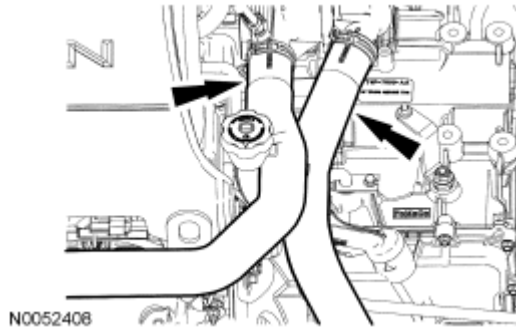
8. Install the transmission fluid drain plug.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 292: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses do not need to be removed from the engine.

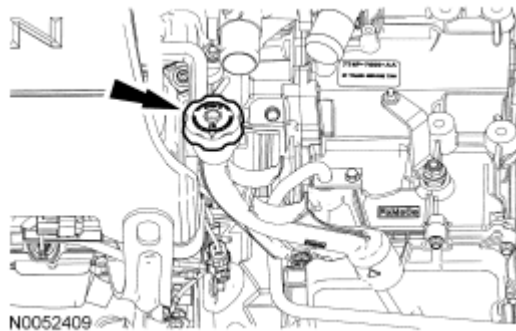
9. Remove the coolant hoses from the transmission fluid filler tube and position aside.



**Fig. 293: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

10. Remove the transmission fluid level indicator.

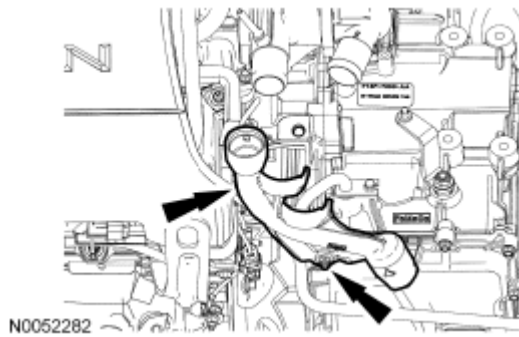


**Fig. 294: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

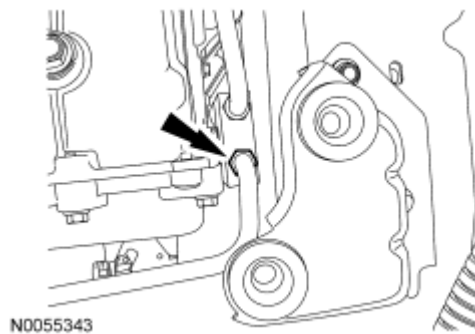
11. Remove the nut, rotate the transmission fluid filler tube counterclockwise 90 degrees and remove the transmission fluid filler tube.





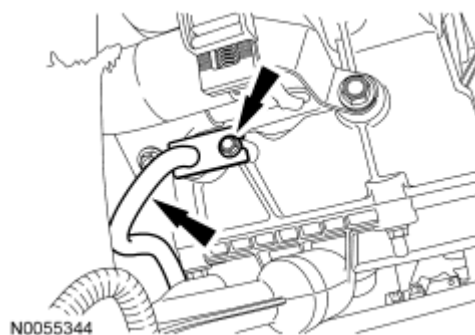
**Fig. 295: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

12. Loosen the transmission fluid cooler tube fitting from the thermal bypass valve.



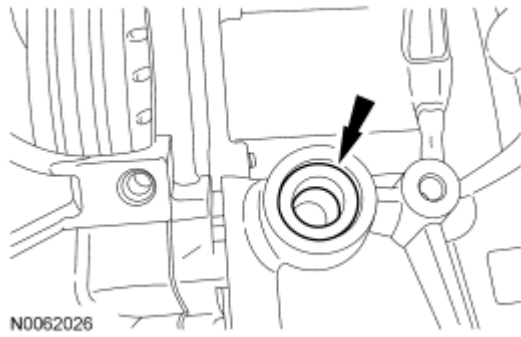
**Fig. 296: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

13. Remove and discard the transmission fluid cooler tube bolt and remove the transmission fluid cooler tube.



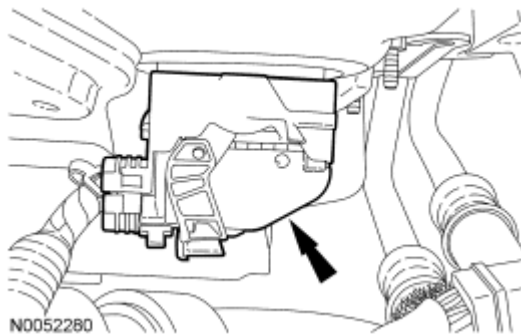
**Fig. 297: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

14. Inspect the transaxle case to make sure that the transmission fluid cooler tube seal and backing ring were removed with the transmission fluid cooler tube and are not stuck in the transaxle case. If the transmission fluid cooler tube seal or backing ring are stuck in the transaxle case, remove the seal and backing ring.



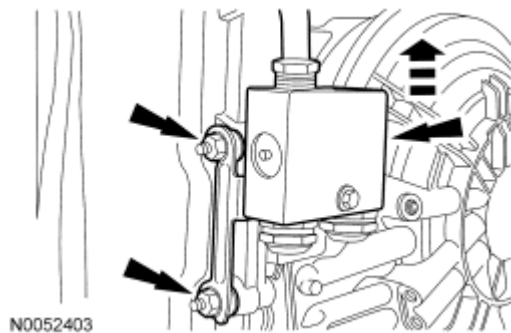
**Fig. 298: Identifying Transmission Fluid Cooler Tube Seal**  
Courtesy of FORD MOTOR CO.

15. Disconnect the transaxle electrical connector.



**Fig. 299: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

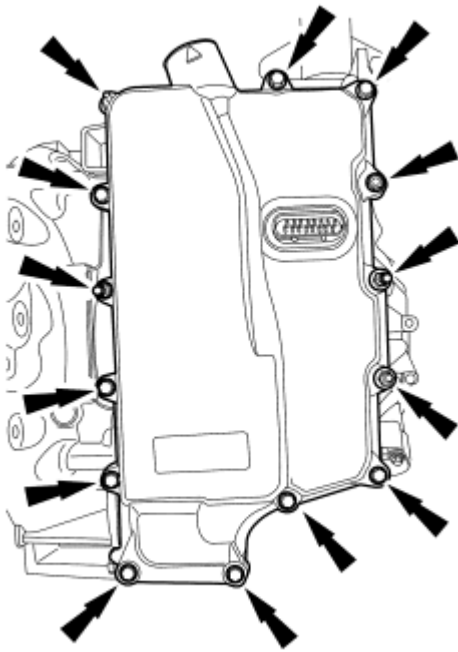
16. Remove the 2 transmission fluid cooler thermal bypass valve nuts, pull the transmission fluid cooler thermal bypass valve straight up and position it aside.



**Fig. 300: Removing Nuts & Pulling Transmission Fluid Cooler Thermal Bypass Valve Straight Up**  
Courtesy of FORD MOTOR CO.

**NOTE:** Note the location of the studbolts for assembly.

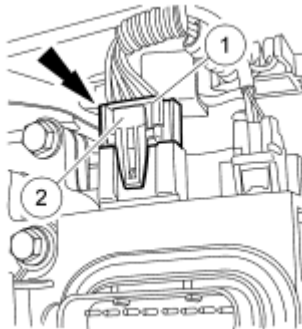
17. Remove the 14 bolts and the main control cover.



N0089296

**Fig. 301: Main Control Valve Cover Bolts**  
Courtesy of FORD MOTOR CO.

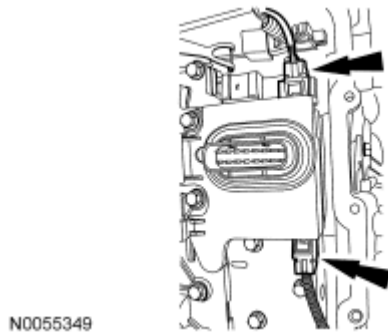
18. Disconnect the Transmission Range (TR) sensor electrical connector.
  1. Slide the lock over.
  2. Press the tab and disconnect the connector.



N0055348

**Fig. 302: Pressing Tab & Disconnecting Connector**  
Courtesy of FORD MOTOR CO.

19. Disconnect the Turbine Shaft Speed (TSS) and Output Shaft Speed (OSS) sensor electrical connectors.



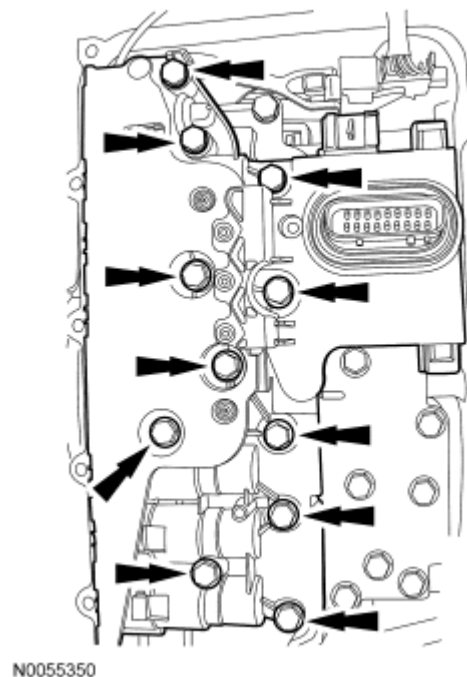
**Fig. 303: Locating Turbine Shaft Speed (TSS) & Output Shaft Speed (OSS) Sensor Electrical Connectors**

Courtesy of FORD MOTOR CO.

**NOTE:** The solenoid body should be handled with care, damage to the solenoid body may occur.

**NOTE:** Note the location of the different length bolts for assembly.

20. Remove the 11 bolts and the solenoid body.



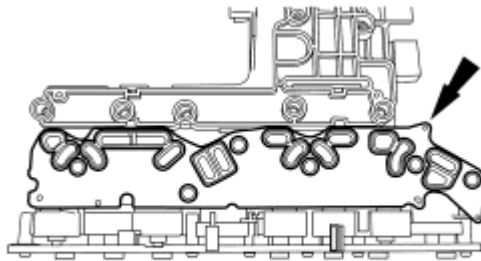
**Fig. 304: Locating Solenoid Body Bolts**

Courtesy of FORD MOTOR CO.

**NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.

**NOTE:** Use care not to break the alignment tabs when installing the solenoid body filter. Damage to the transaxle will occur if the solenoid body is not correctly aligned.

21. Remove the solenoid body filter assembly by pulling it straight up from the alignment tabs. Discard the filter.



N0055016

**Fig. 305: Identifying Solenoid Body Filter Assembly**  
Courtesy of FORD MOTOR CO.

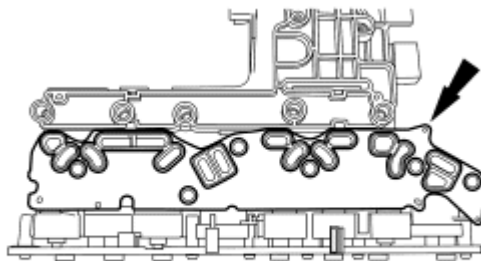
## INSTALLATION

**NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.

**NOTE:** Use care not to break the alignment tabs when installing the solenoid body filter. Damage to the transaxle will occur if the solenoid body is not correctly aligned.

**NOTE:** Make sure that the filter passage areas are clean of foreign material before installing the filter. Damage to the transaxle will occur if the filter passages are not clean.

1. Install a new solenoid body filter assembly by pushing it straight down on to the alignment tabs.



N0055016

**Fig. 306: Identifying Solenoid Body Filter Assembly**

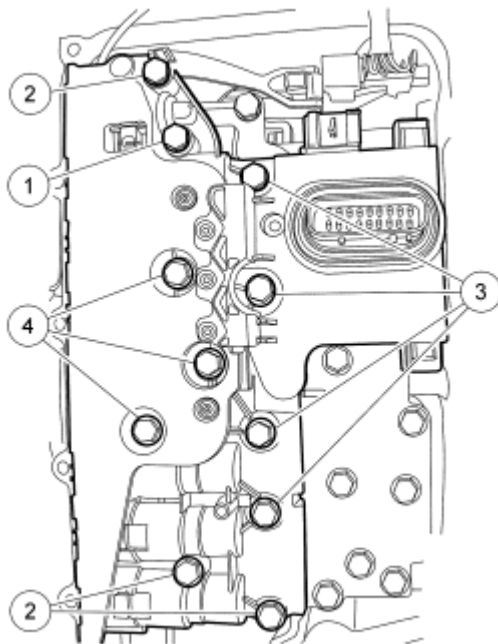
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure not to pinch the Turbine Shaft Speed (TSS), Output Shaft Speed (OSS) or Transmission Range (TR) sensor wiring harnesses when installing the solenoid body. Damage to the wiring harness will occur.

**NOTE:** Install the different length bolts in the locations noted during disassembly.

2. Install the solenoid body and the 11 bolts.

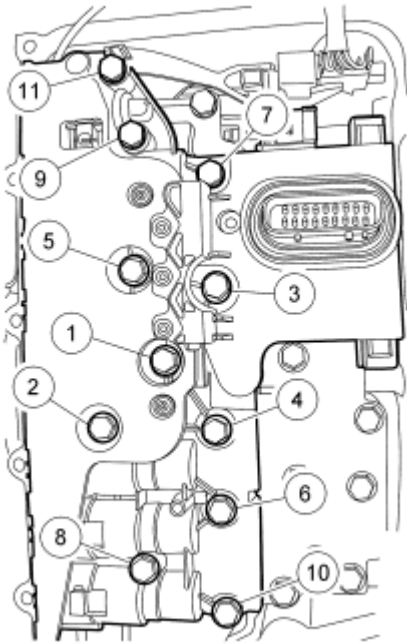
1. 42 mm (1.65 in) bolt
2. 63 mm (2.48 in) bolts
3. 80 mm (3.14 in) bolts
4. 95 mm (3.74 in) bolts



**Fig. 307: Locating Solenoid Body Bolts**  
Courtesy of FORD MOTOR CO.

3. Tighten the solenoid body bolts in the sequence shown.

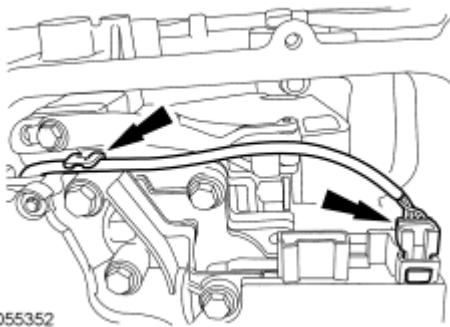
- Tighten to 12 Nm (106 lb-in).



N0055351

**Fig. 308: Tightening Solenoid Body Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

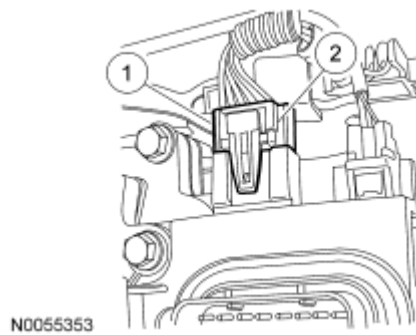
4. Route the OSS sensor wiring harness and connect the electrical connector.



N0055352

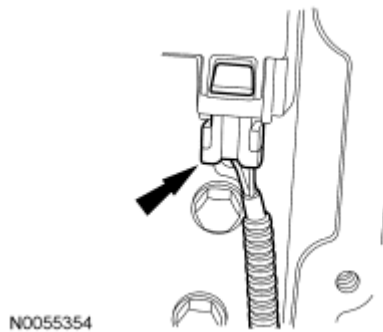
**Fig. 309: Locating OSS Sensor Wiring Harness & Electrical Connector**  
Courtesy of FORD MOTOR CO.

5. Connect the TR sensor electrical connector.
  1. Connect the electrical connector.
  2. Slide the locking tab over.



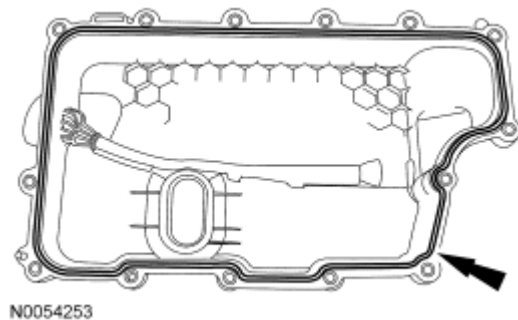
**Fig. 310: Identifying TR Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

6. Connect the TSS sensor electrical connector.



**Fig. 311: Identifying TSS Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

7. Inspect the transaxle main control cover seal for damage and install new if necessary.



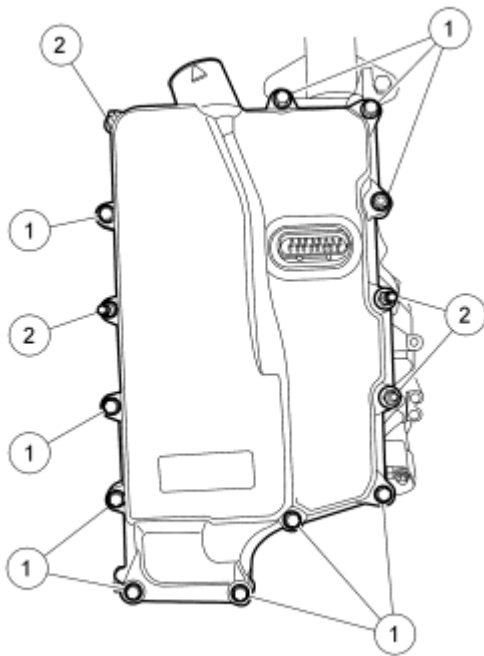
**Fig. 312: Inspecting Transaxle Main Control Cover Seal For Damage**  
Courtesy of FORD MOTOR CO.

**NOTE:** Inspect the 20-pin solenoid body connector seal to make sure that the seal is on the inside of the main control cover or a transmission fluid leak will occur resulting in transmission damage.



**NOTE:** Install the studbolts in the locations noted during disassembly.

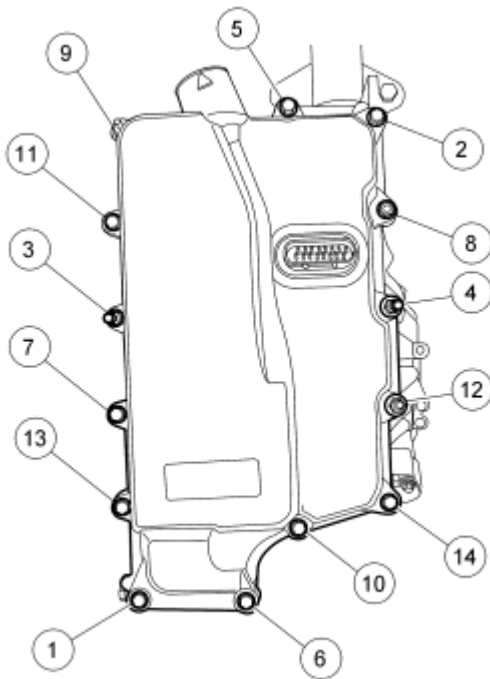
8. Install the main control cover and loosely install the 14 bolts.
  1. Bolt location
  2. Studbolt location



N0089295

**Fig. 313: Main Control Cover Bolts**  
Courtesy of FORD MOTOR CO.

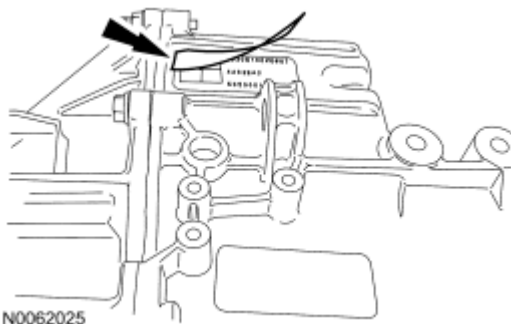
9. Tighten the main control cover bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).



N0089294

**Fig. 314: Main Control Cover Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

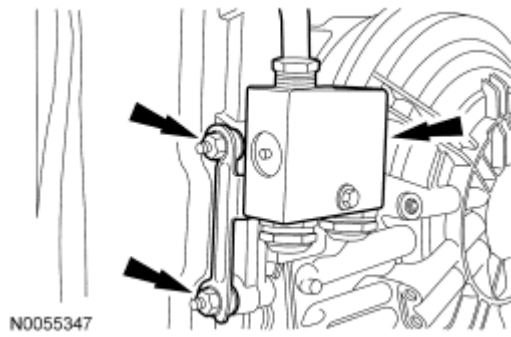
10. Wipe the surface of the existing solenoid body strategy tag on top of the transaxle case clean and install the new solenoid body strategy tag (supplied with the solenoid body service kit) over it.



N0062025

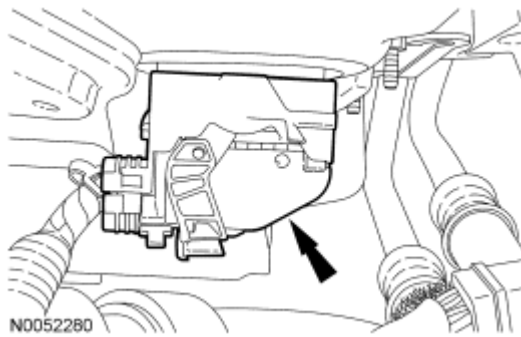
**Fig. 315: Installing New Solenoid Body Strategy Tag Over Existing Solenoid Body Strategy Tag**  
Courtesy of FORD MOTOR CO.

11. Position the transmission fluid cooler thermal bypass valve and transmission fluid cooler tube assembly in place and install the 2 transmission fluid cooler thermal bypass valve bracket nuts.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 316: Identifying Transmission Fluid Cooler Tube Assembly & Nuts**  
Courtesy of FORD MOTOR CO.

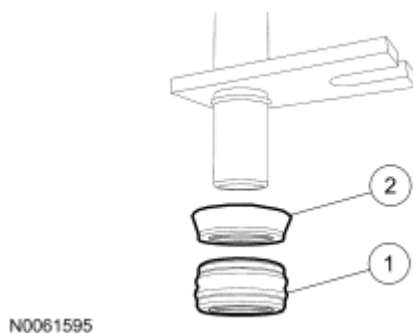
12. Connect the transaxle electrical connector.



**Fig. 317: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

13. Inspect the transmission fluid cooler tube backing ring and seal for damage and install a new backing ring or seal if necessary. Lubricate the transmission fluid cooler tube seal with clean transmission fluid and install the backing ring and seal on the transmission fluid cooler tube.

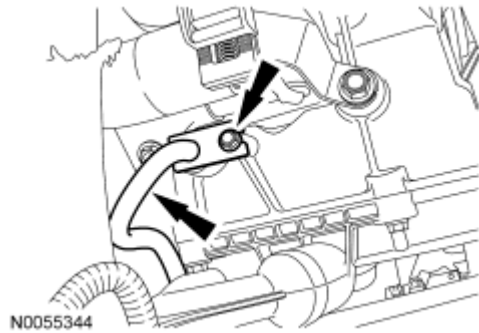
Item	Part Number	Description
1	7D285	Seal
2	7J324	Backing ring



**Fig. 318: Identifying Transmission Fluid Cooler Tube Backing Ring & Seal**

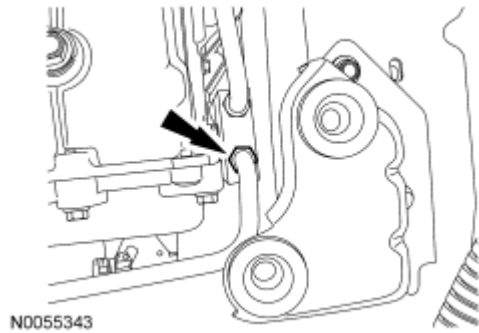
Courtesy of FORD MOTOR CO.

14. Position the transmission fluid cooler tube in place and install a new bolt.
  - Tighten to 9 Nm (80 lb-in).



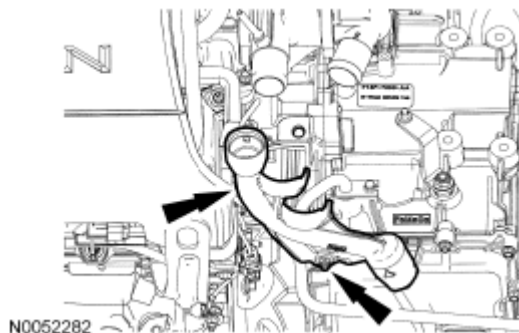
**Fig. 319: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

15. Tighten the transmission fluid cooler tube fitting.
  - Tighten to 25 Nm (18 lb-ft).



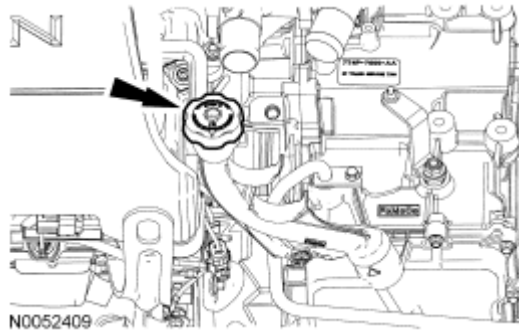
**Fig. 320: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

16. Install the transmission fluid filler tube and the nut.
  - Tighten to 11 Nm (97 lb-in).



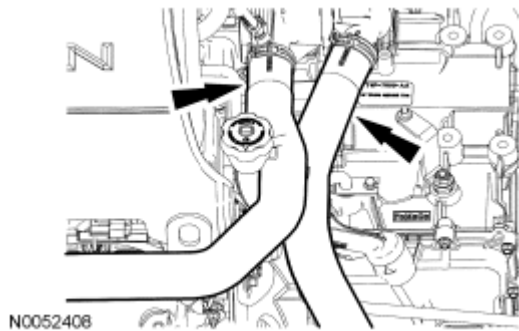
**Fig. 321: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

17. Install the transmission fluid level indicator.



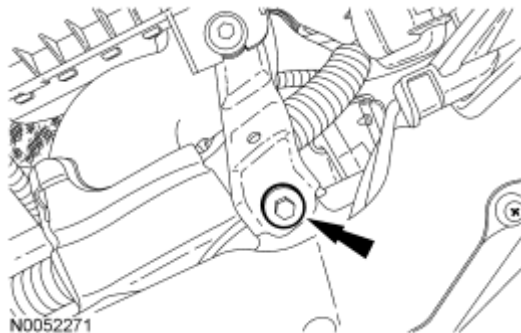
**Fig. 322: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

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



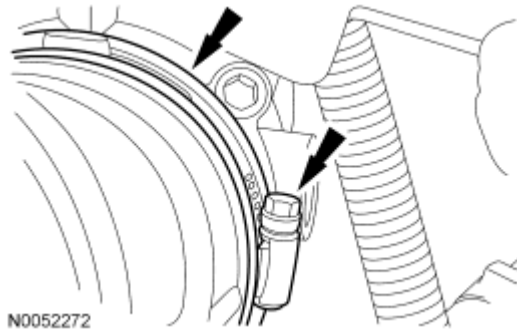
**Fig. 323: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

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



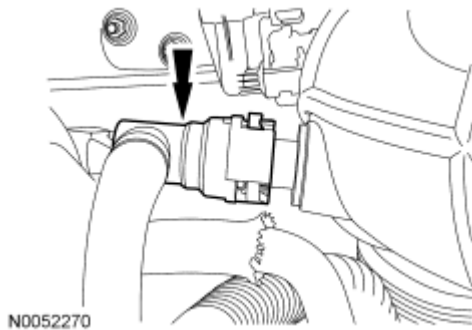
**Fig. 324: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

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



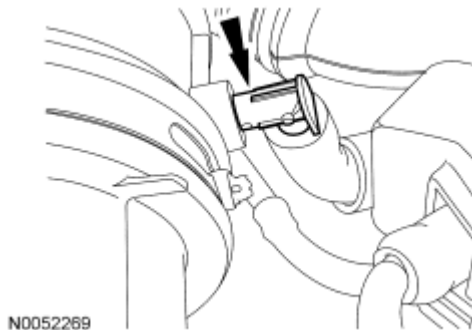
**Fig. 325: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

21. Connect the engine breather to the ACL assembly.



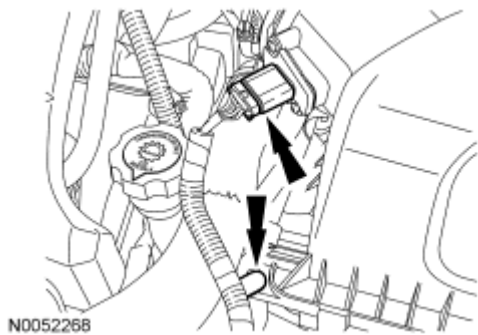
**Fig. 326: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

22. Connect the brake booster vacuum hose to the ACL assembly.



**Fig. 327: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

23. Connect the MAF sensor electrical connector and connect the electrical harness fastener.



**Fig. 328: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

- 24. Fill with clean transmission fluid to the correct level.
- 25. Download a new solenoid body strategy to the PCM. Refer to **Solenoid Body Strategy**.

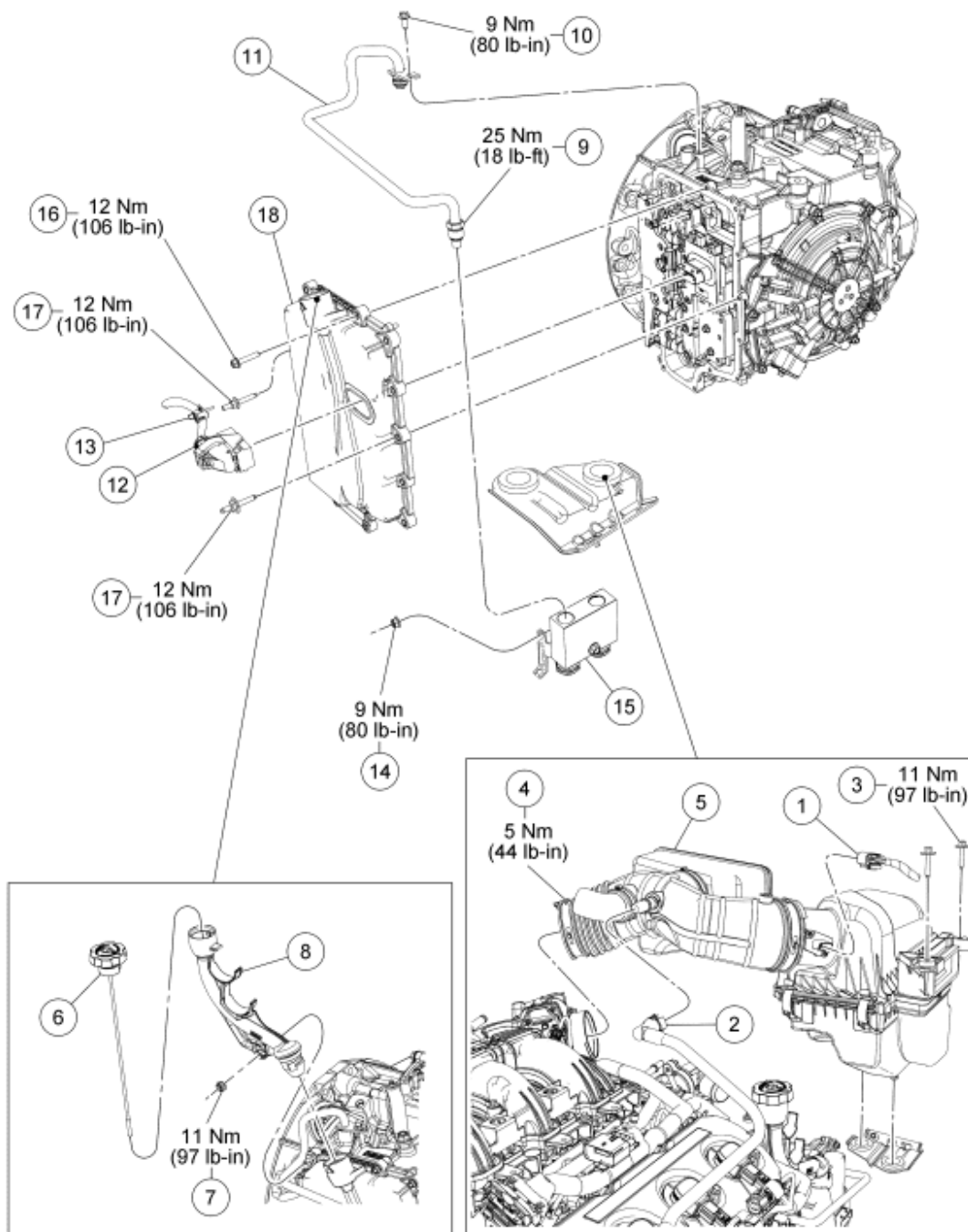
**MAIN CONTROL COVER**

**Material**

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX



N0089292

**Fig. 329: Main Control & Solenoid Body Components (With Torque Specifications)**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	14A464	Electrical connector - Mass Air Flow (MAF) sensor
2	6758	Tube assembly - crankcase vent



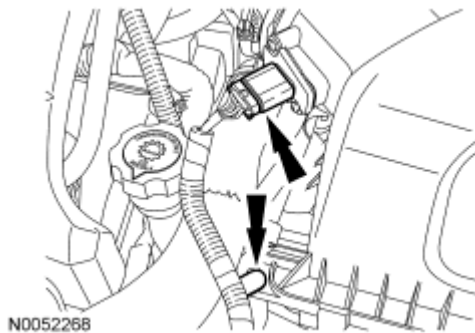
## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

3	N606678	Bolt - Air Cleaner (ACL) bracket
4	9C632	Clamp - ACL outlet pipe
5	9C662	ACL assembly
6	7A020	Transmission fluid level indicator
7	W520101	Transmission fluid filler tube nut
8	7A228	Transmission fluid filler tube
9	-	Nut - transmission fluid cooler tube (part of 7H420)
10	W711538	Bolt - transmission fluid cooler tube
11	7H420	Tube - transmission fluid cooler
12	7A488	Connector - transaxle harness
13	14A169	Retainer - transaxle harness
14	W520101	Nut - bypass valve
15	7H322	Valve - transaxle fluid cooler bypass
16	7J289	Bolt - solenoid body cover (11 required)
17	W708442	Studbolt - solenoid body cover (3 required)
18	7G004	Cover - solenoid body

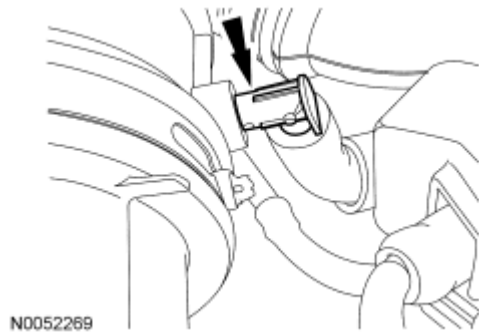
### REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.
2. Disconnect the Mass Air Flow (MAF) sensor electrical connector and the wiring harness fastener from the Air Cleaner (ACL) assembly.



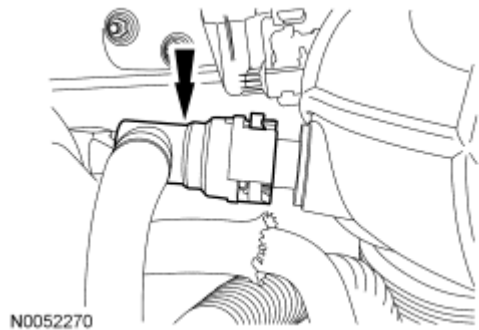
**Fig. 330: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

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



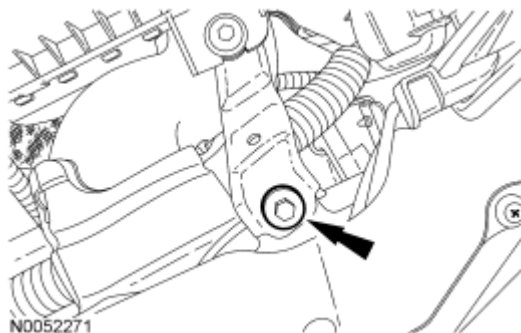
**Fig. 331: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

4. Disconnect the engine breather from the ACL assembly.



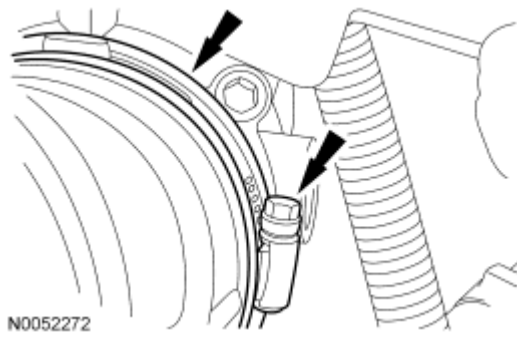
**Fig. 332: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

5. Remove the ACL assembly bracket bolt.



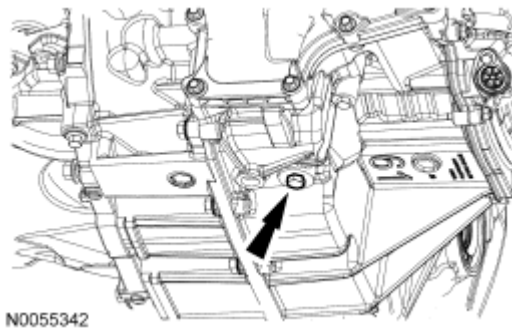
**Fig. 333: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

6. Loosen the ACL outlet pipe clamp at the Throttle Body (TB) and remove the ACL and ACL outlet pipe assembly.



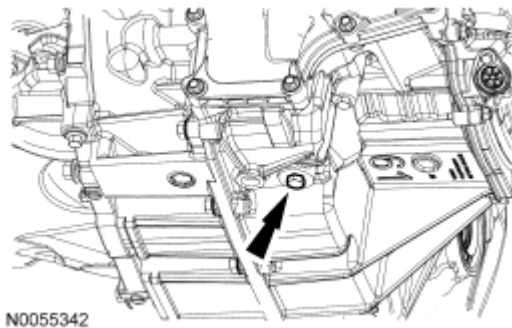
**Fig. 334: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

7. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



**Fig. 335: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

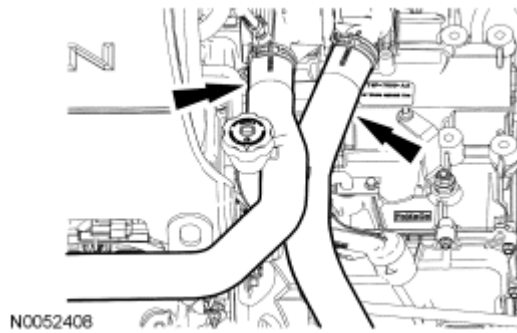
8. Install the transmission fluid drain plug.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 336: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses do not need to be removed from the engine.

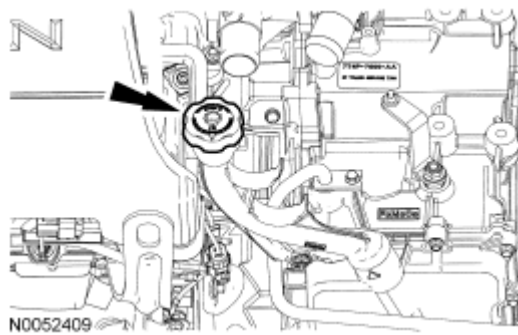
9. Remove the coolant hoses from the transmission fluid filler tube and position aside.



**Fig. 337: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

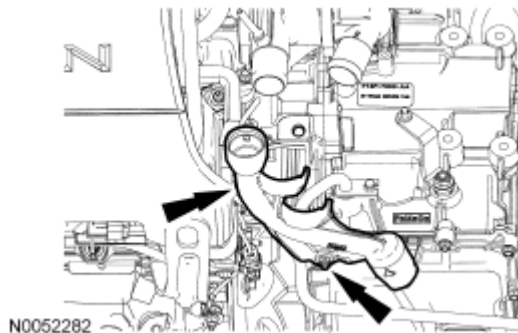
10. Remove the transmission fluid level indicator.



**Fig. 338: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

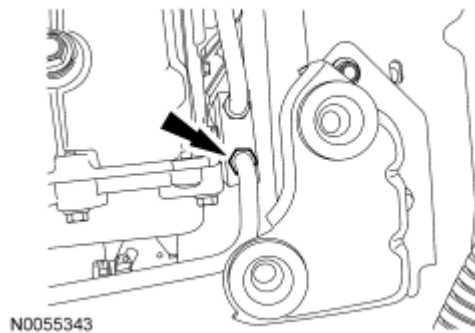
**NOTE:** The coolant hoses have been removed for clarity.

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



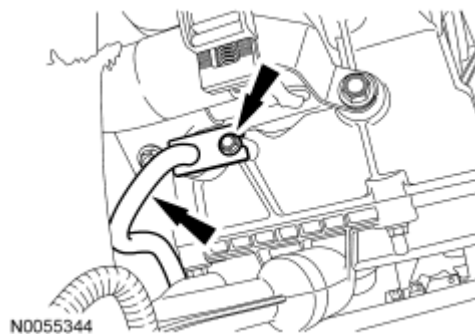
**Fig. 339: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

12. Loosen the transmission fluid cooler tube fitting from the thermal bypass valve.



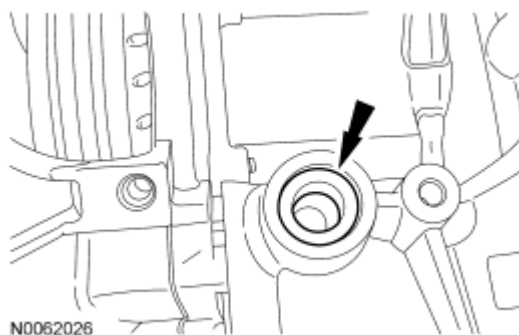
**Fig. 340: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

13. Remove and discard the transmission fluid cooler tube bolt and remove the transmission fluid cooler tube.



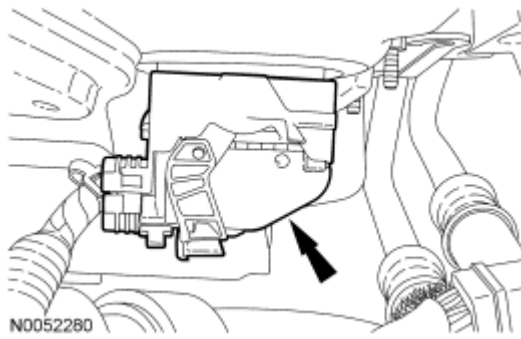
**Fig. 341: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

14. Inspect the transaxle case to make sure that the transmission fluid cooler tube seal and backing ring were removed with the transmission fluid cooler tube and are not stuck in the transaxle case. If the transmission fluid cooler tube seal or backing ring are stuck in the transaxle case, remove the seal and backing ring.



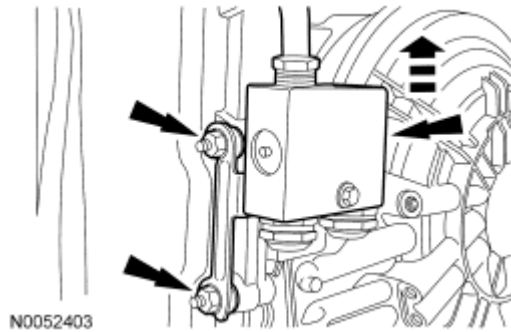
**Fig. 342: Identifying Transmission Fluid Cooler Tube Seal**  
Courtesy of FORD MOTOR CO.

15. Disconnect the transaxle electrical connector.



**Fig. 343: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

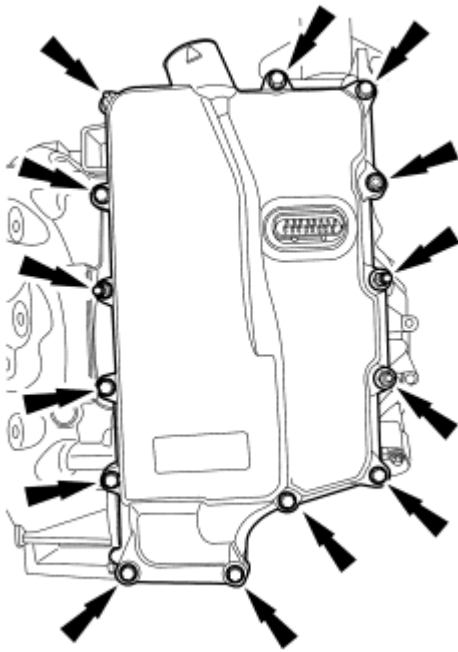
16. Remove the 2 transmission fluid cooler thermal bypass valve bracket nuts, pull the transmission fluid cooler thermal bypass valve straight up and position it aside.



**Fig. 344: Removing Nuts & Pulling Transmission Fluid Cooler Thermal Bypass Valve Straight Up**  
Courtesy of FORD MOTOR CO.

**NOTE:** Note the location of the studbolts for assembly.

17. Remove the 14 bolts and the main control cover.

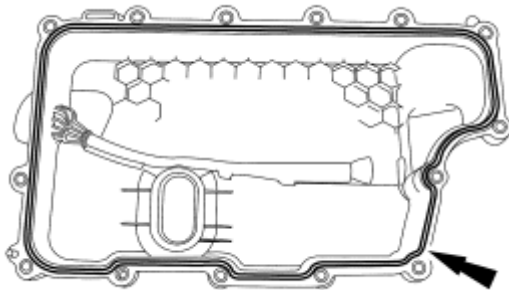


N0089296

**Fig. 345: Main Control Valve Cover Bolts**  
Courtesy of FORD MOTOR CO.

## INSTALLATION

1. Inspect the transaxle main control cover seal for damage and install new if necessary.



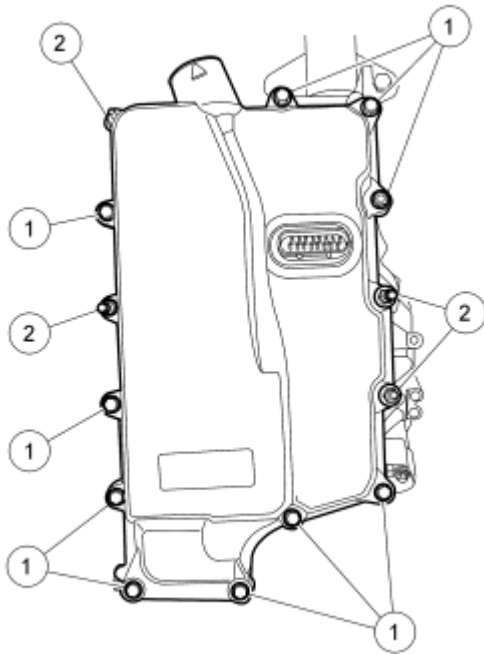
N0054253

**Fig. 346: Inspecting Transaxle Main Control Cover Seal For Damage**  
Courtesy of FORD MOTOR CO.

**NOTE:** Inspect the 20-pin solenoid body connector seal to make sure that the seal is on the inside of the main control cover or a transmission fluid leak will occur resulting in transmission damage.

**NOTE:** Install the studbolts in the locations noted during disassembly.

2. Install the main control cover and loosely install the 14 bolts.
  1. Bolt location
  2. Studbolt location

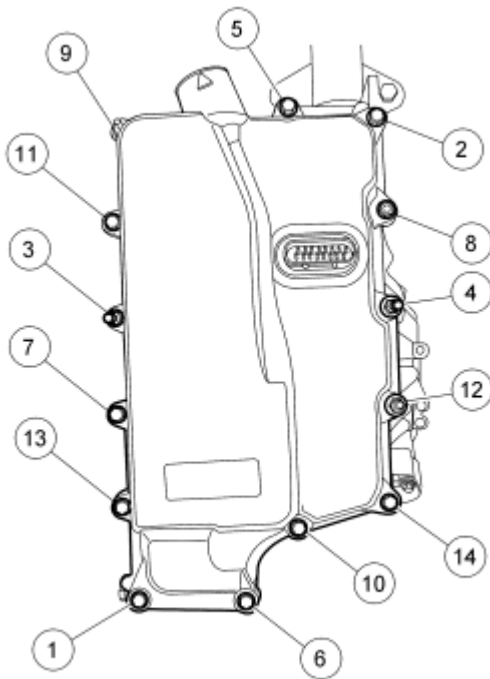


N0089295

**Fig. 347: Main Control Cover Bolts**  
Courtesy of FORD MOTOR CO.

3. Tighten the main control cover bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).

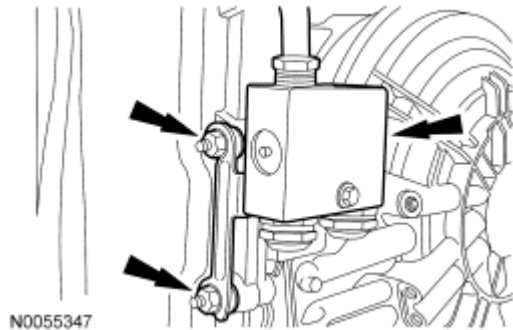




N0089294

**Fig. 348: Main Control Cover Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

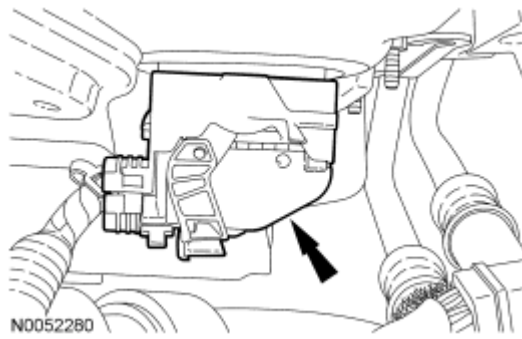
4. Position the transmission fluid cooler thermal bypass valve and transmission fluid cooler tube assembly in place and install the 2 transmission fluid cooler thermal bypass valve bracket nuts.
  - Tighten to 9 Nm (80 lb-in).



N0055347

**Fig. 349: Identifying Transmission Fluid Cooler Tube Assembly & Nuts**  
Courtesy of FORD MOTOR CO.

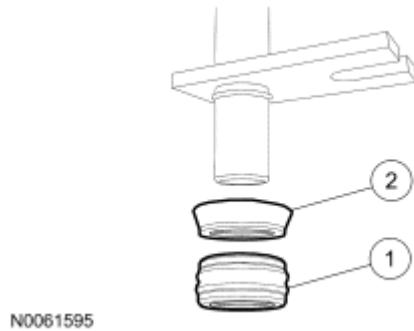
5. Connect the transaxle electrical connector.



**Fig. 350: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

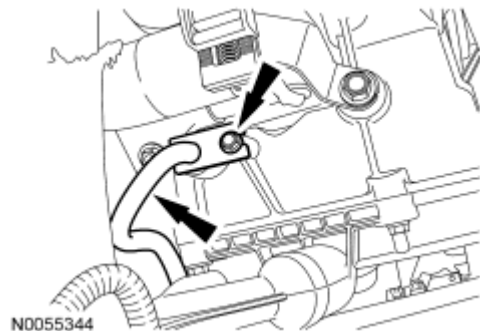
6. Inspect the transmission fluid cooler tube backing ring and seal for damage and install a new backing ring or seal if necessary. Lubricate the transmission fluid cooler tube seal with clean transmission fluid and install the backing ring and seal on the transmission fluid cooler tube.

Item	Part Number	Description
1	7D285	Seal
2	7J324	Backing ring



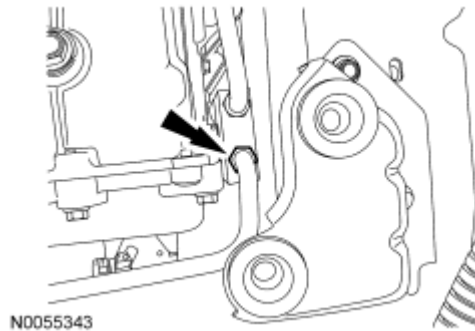
**Fig. 351: Identifying Transmission Fluid Cooler Tube Backing Ring & Seal**  
Courtesy of FORD MOTOR CO.

7. Position the transmission fluid cooler tube in place and install a new bolt.
  - Tighten to 9 Nm (80 lb-in).



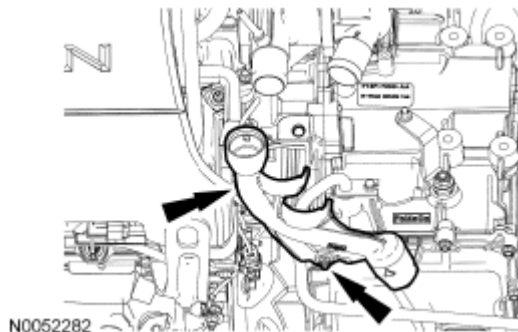
**Fig. 352: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

8. Tighten the transmission fluid cooler tube fitting.
  - Tighten to 25 Nm (18 lb-ft).



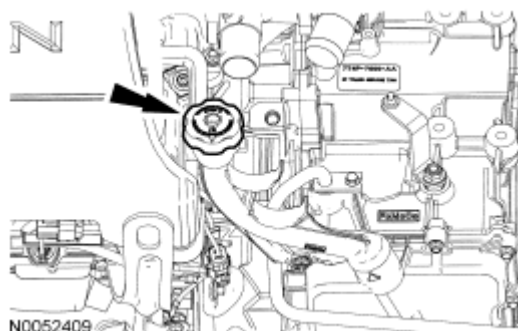
**Fig. 353: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

9. Install the transmission fluid filler tube and the nut.
  - Tighten to 11 Nm (97 lb-in).



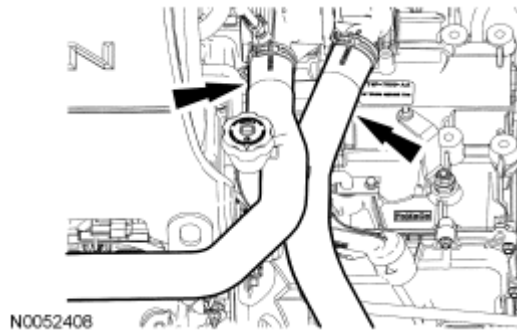
**Fig. 354: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

10. Install the transmission fluid level indicator.



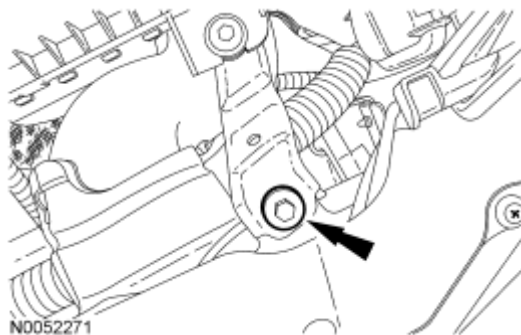
**Fig. 355: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

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



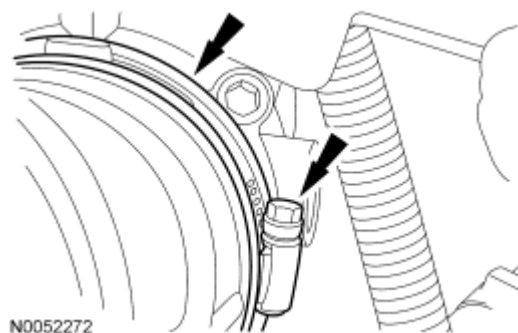
**Fig. 356: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

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



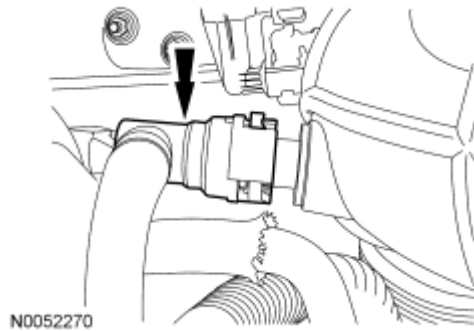
**Fig. 357: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

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



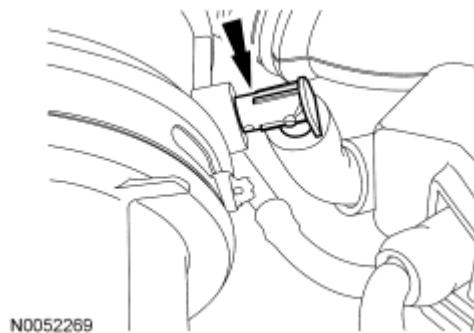
**Fig. 358: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

14. Connect the engine breather to the ACL assembly.



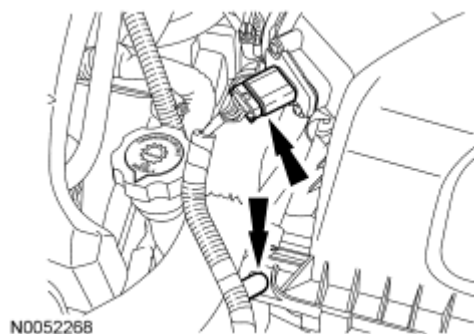
**Fig. 359: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

15. Connect the brake booster vacuum hose to the ACL assembly.



**Fig. 360: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

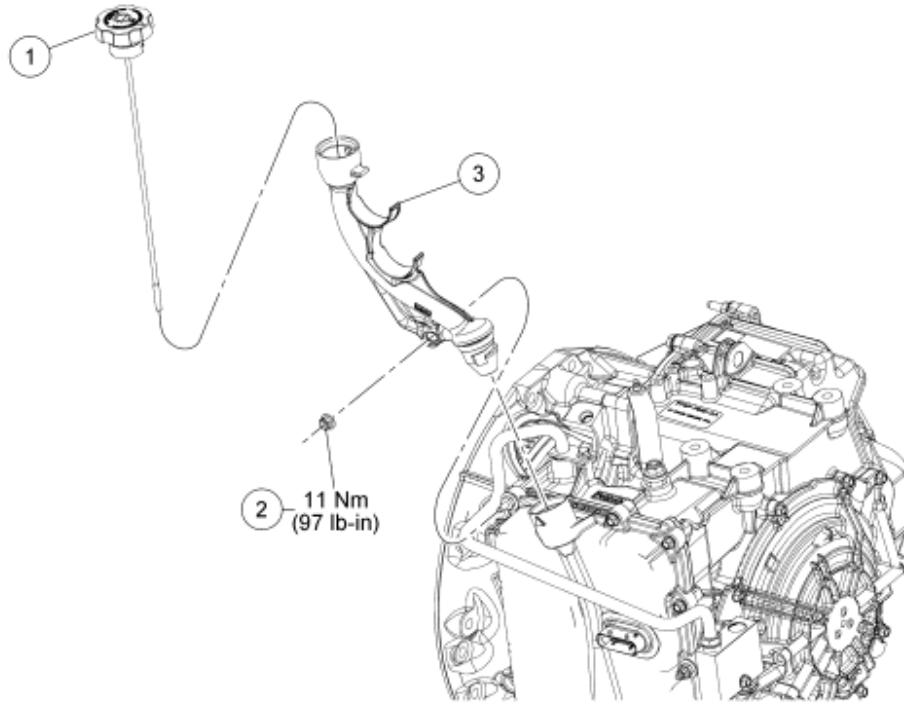
16. Connect the MAF sensor electrical connector and connect the electrical harness fastener.



**Fig. 361: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

17. Fill with clean transmission fluid to the correct level.

### TRANSAXLE FILLER TUBE



N0082884

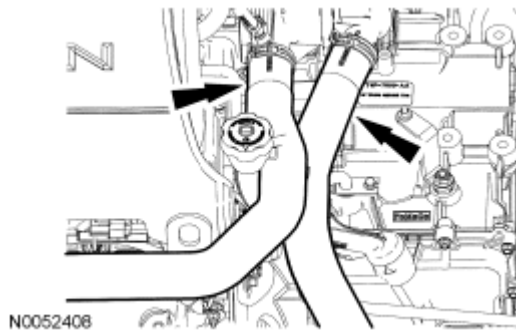
**Fig. 362: Transaxle Filler Tube (With Torque Specifications)**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7A020	Transmission fluid level indicator
2	W520101	Transmission fluid filler tube nut
3	7A228	Transmission fluid filler tube

### REMOVAL

**NOTE:** The coolant hoses do not need to be removed from the engine.

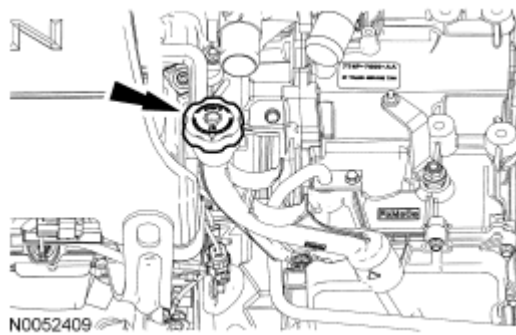
1. Remove the coolant hoses from the transmission fluid filler tube and position aside.



**Fig. 363: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

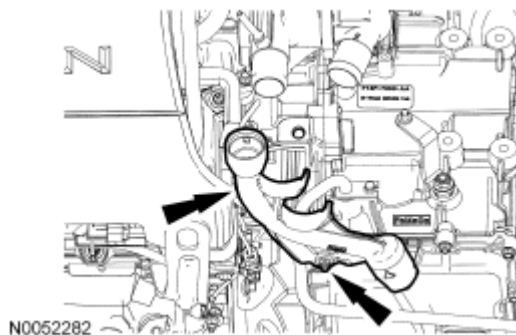
2. Remove the transmission fluid level indicator.



**Fig. 364: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

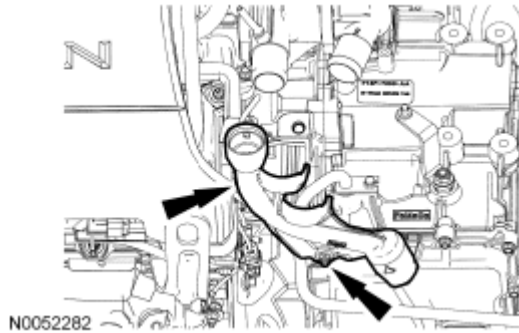
3. Remove the nut, rotate the transmission fluid filler tube counterclockwise 90 degrees and remove the transmission fluid filler tube.



**Fig. 365: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

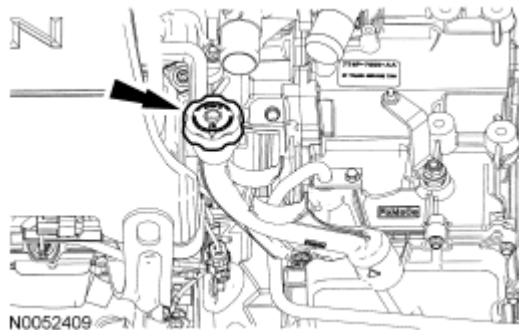
**INSTALLATION**

1. Install the transmission fluid filler tube and the nut.
  - Tighten to 11 Nm (97 lb-in).



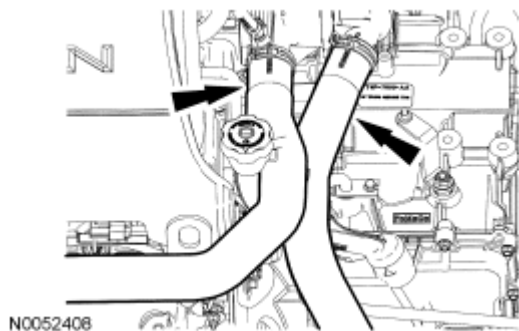
**Fig. 366: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

2. Install the transmission fluid level indicator.



**Fig. 367: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

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



**Fig. 368: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

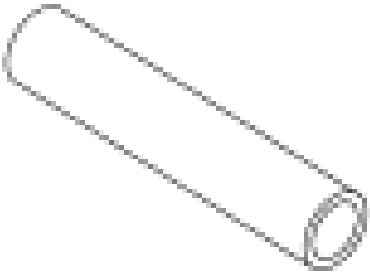
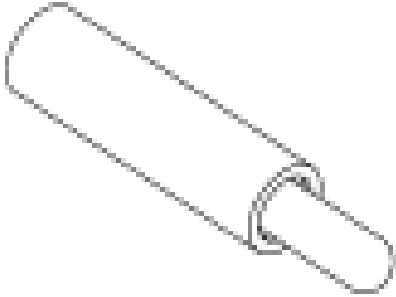


## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

### MANUAL CONTROL LEVER SHAFT SEAL

#### Special Tools

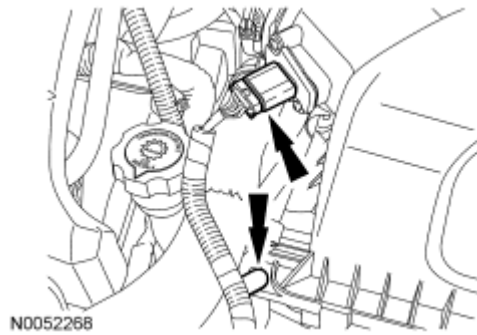
Illustration	Tool Name	Tool Number
 ST3000-A	Installer, Manual Lever Retaining Pin	307-592
 ST2999-A	Installer, Manual Lever Shaft Seal	307-581

#### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

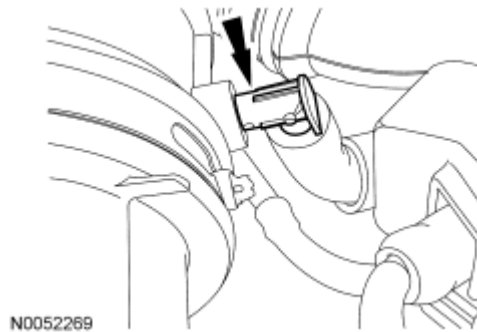
#### REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.
2. Disconnect the Mass Air Flow (MAF) sensor electrical connector and the wiring harness fastener from the Air Cleaner (ACL) assembly.



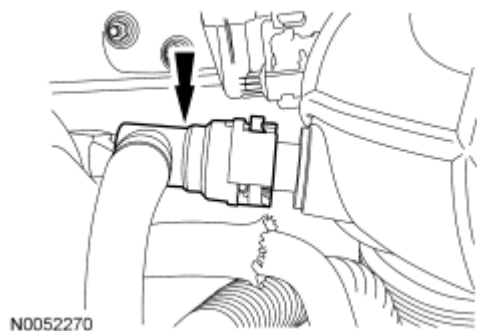
**Fig. 369: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

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



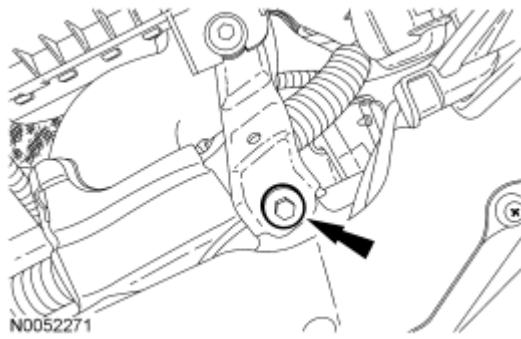
**Fig. 370: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

4. Disconnect the engine breather from the ACL assembly.



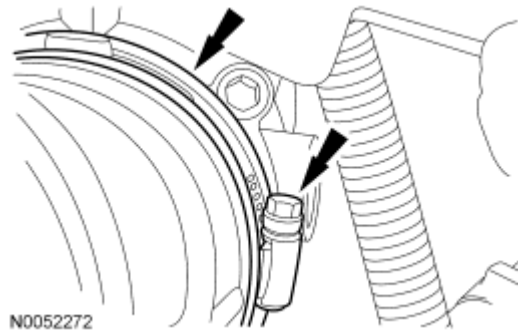
**Fig. 371: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

5. Remove the ACL assembly bracket bolt.



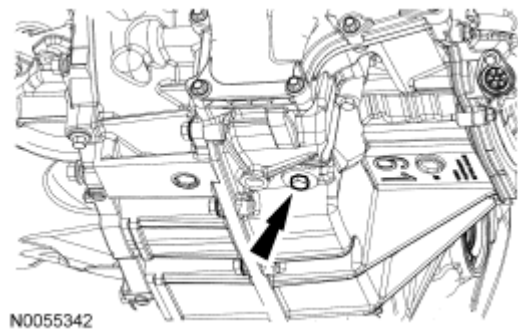
**Fig. 372: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

6. Loosen the ACL outlet pipe clamp at the Throttle Body (TB) and remove the ACL and ACL outlet pipe assembly.



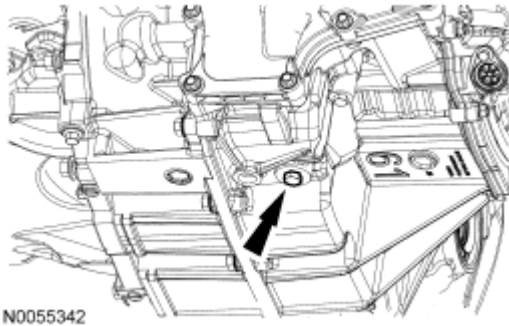
**Fig. 373: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

7. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



**Fig. 374: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

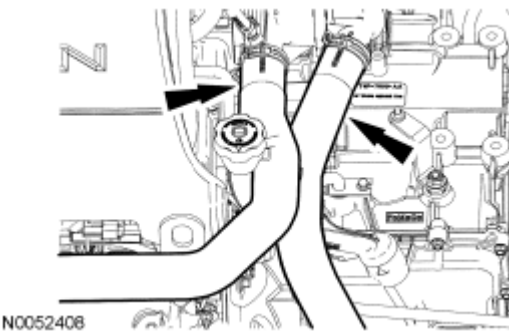
8. Install the transmission fluid drain plug.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 375: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses do not need to be removed from the engine.

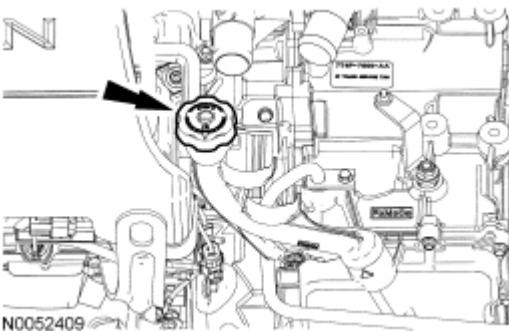
9. Remove the coolant hoses from the transmission fluid filler tube and position aside.



**Fig. 376: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

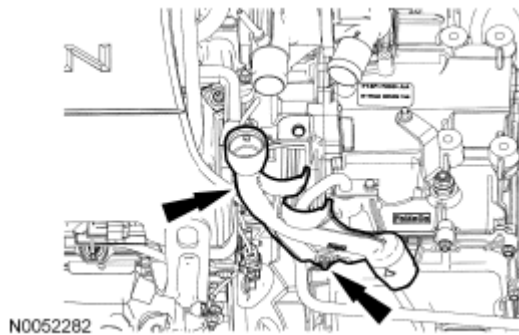
10. Remove the transmission fluid level indicator.



**Fig. 377: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

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



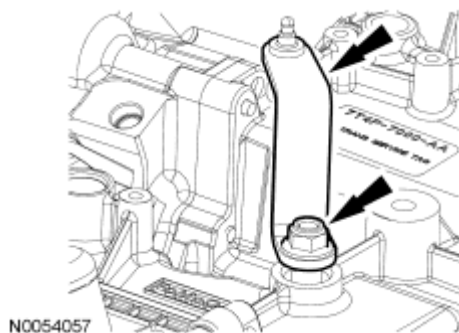
**Fig. 378: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

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



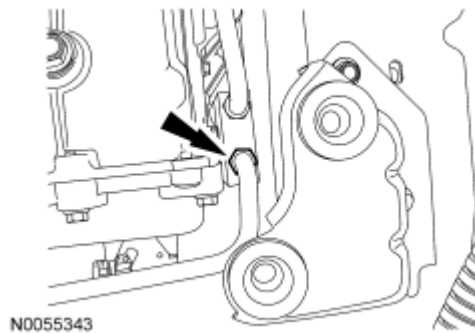
**Fig. 379: Locating Selector Lever Cable End From Manual Lever**  
Courtesy of FORD MOTOR CO.

13. Remove the nut and the manual control lever.



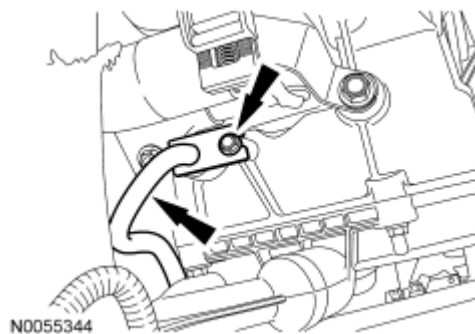
**Fig. 380: Identifying Manual Control Lever & Nut**  
Courtesy of FORD MOTOR CO.

14. Loosen the transmission fluid cooler tube fitting from the thermal bypass valve.



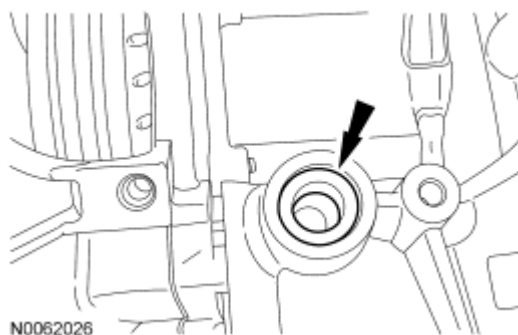
**Fig. 381: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

15. Remove and discard the transmission fluid cooler tube bolt and remove the transmission fluid cooler tube.



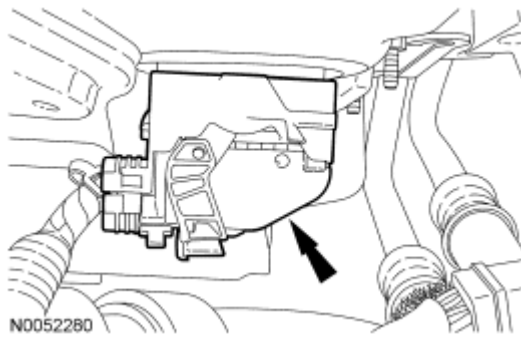
**Fig. 382: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

16. Inspect the transaxle case to make sure that the transmission fluid cooler tube seal and backing ring were removed with the transmission fluid cooler tube and are not stuck in the transaxle case. If the transmission fluid cooler tube seal or backing ring are stuck in the transaxle case, remove the seal and backing ring.



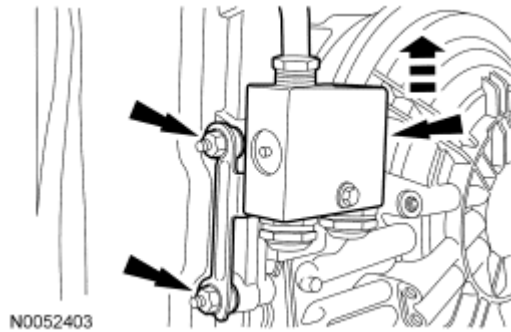
**Fig. 383: Identifying Transmission Fluid Cooler Tube Seal**  
Courtesy of FORD MOTOR CO.

17. Disconnect the transaxle electrical connector.



**Fig. 384: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

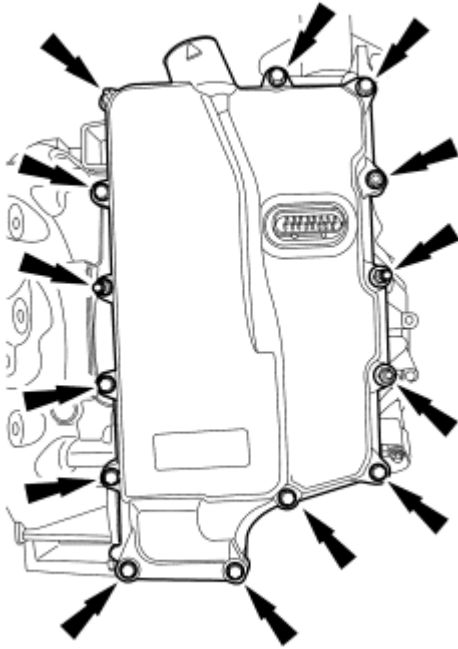
18. Remove the transmission fluid cooler tube bracket nuts, pull the transmission fluid cooler thermal bypass valve straight up and position it aside.



**Fig. 385: Removing Nuts & Pulling Transmission Fluid Cooler Thermal Bypass Valve Straight Up**  
Courtesy of FORD MOTOR CO.

**NOTE:** Note the location of the studbolts for assembly.

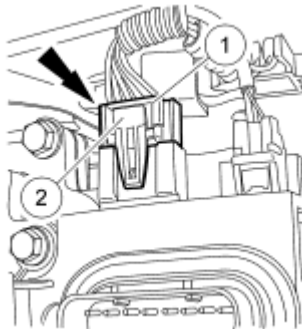
19. Remove the bolts and the main control cover.



N0089296

**Fig. 386: Main Control Valve Cover Bolts**  
Courtesy of FORD MOTOR CO.

20. Disconnect the Transmission Range (TR) sensor electrical connector.
1. Slide the lock over.
  2. Press the tab and disconnect the connector.

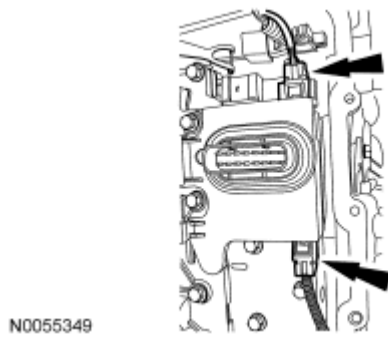


N0055348

**Fig. 387: Pressing Tab & Disconnecting Connector**  
Courtesy of FORD MOTOR CO.

21. Disconnect the Turbine Shaft Speed (TSS) and Output Shaft Speed (OSS) sensor electrical connectors.





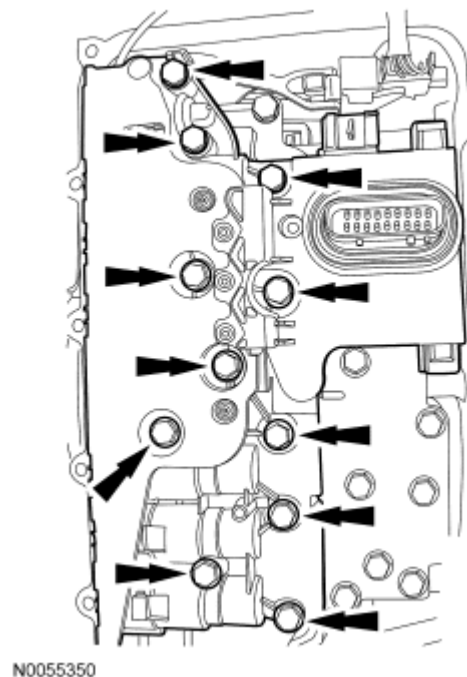
**Fig. 388: Locating Turbine Shaft Speed (TSS) & Output Shaft Speed (OSS) Sensor Electrical Connectors**

Courtesy of FORD MOTOR CO.

**NOTE:** The solenoid body should be handled with care, damage to the solenoid body may occur.

**NOTE:** Note the location of the different length bolts for assembly.

22. Remove the bolts and the solenoid body.



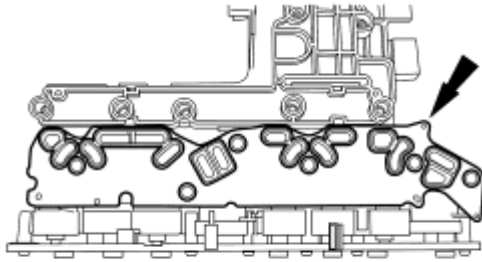
**Fig. 389: Locating Solenoid Body Bolts**

Courtesy of FORD MOTOR CO.

**NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.

**NOTE:** Use care not to break the alignment tabs when removing the solenoid body filter.

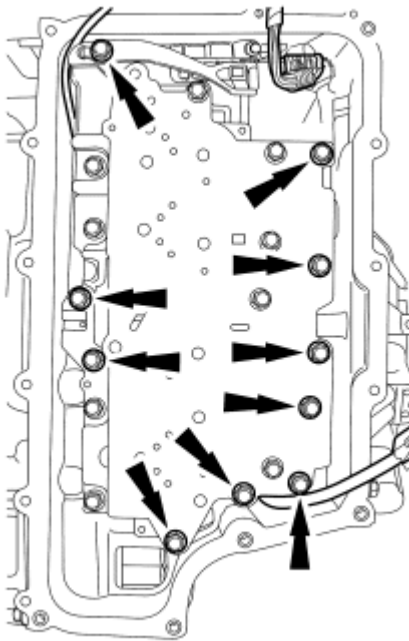
23. Remove the solenoid body filter assembly by pulling it straight up from the alignment tabs. Discard the filter.



N0055016

**Fig. 390: Identifying Solenoid Body Filter Assembly**  
Courtesy of FORD MOTOR CO.

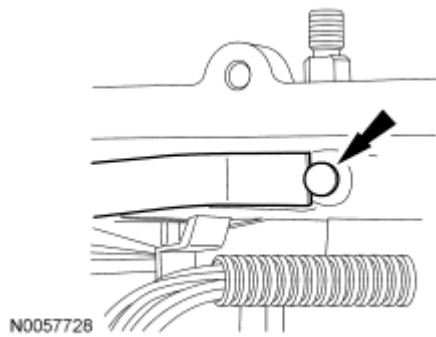
24. Remove the bolts, the TR sensor detent spring and the main control valve body.



N0057465

**Fig. 391: Locating Main Control Valve Body Bolts**  
Courtesy of FORD MOTOR CO.

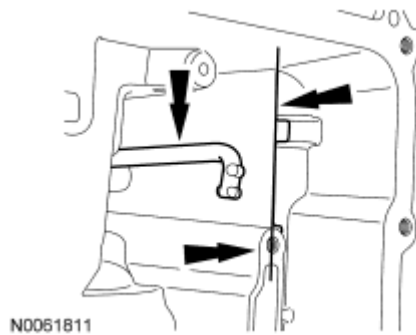
25. Using a suitable tool, remove and discard the TR sensor locking pin.



**Fig. 392: Locating TR Sensor Locking Pin**  
Courtesy of FORD MOTOR CO.

**NOTE:** TR sensor removed for clarity.

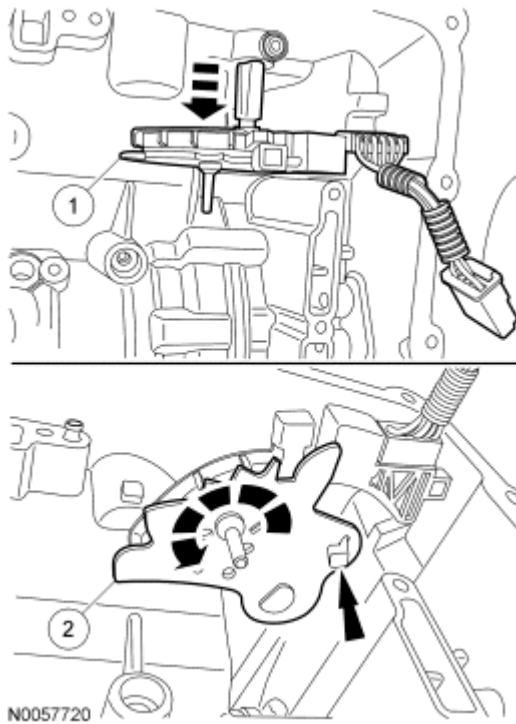
26. Make sure that the park pawl actuator rod does not become disengaged from the park pawl and the abutment by keeping the end of the park pawl actuator rod behind the machined valve body mating surface of the transaxle case. If the park pawl actuator rod becomes disengaged from the park pawl and the abutment, transaxle removal and disassembly is required to reinstall the actuator rod.



**Fig. 393: Making Sure That Park Pawl Actuator Rod Does Not Become Disengaged From Park Pawl**  
Courtesy of FORD MOTOR CO.

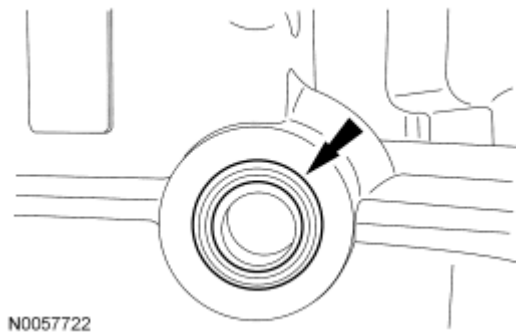
**NOTE:** Make sure that the park pawl actuator rod does not become disengaged from the park pawl and the abutment or transaxle removal and disassembly is required to reinstall the actuator rod.

27. Remove the TR sensor.
  1. Slide the TR sensor down until the manual shaft is out of the transaxle case.
  2. Rotate the TR sensor detent plate counterclockwise, as viewed from below until the plate rests against the transaxle case, remove the park pawl actuating rod from the TR sensor and remove the TR sensor.



**Fig. 394: Sliding TR Sensor Down & Rotating TR Sensor Detent Plate Counterclockwise**  
Courtesy of FORD MOTOR CO.

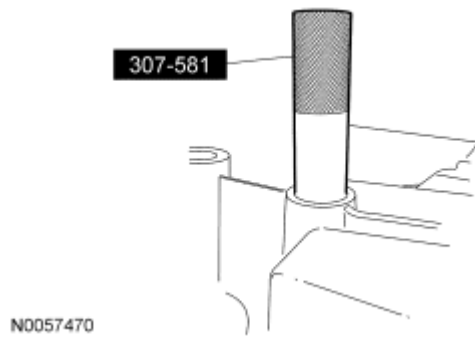
28. Using a suitable tool, remove the manual control lever shaft seal.



**Fig. 395: Identifying Manual Control Lever Shaft Seal**  
Courtesy of FORD MOTOR CO.

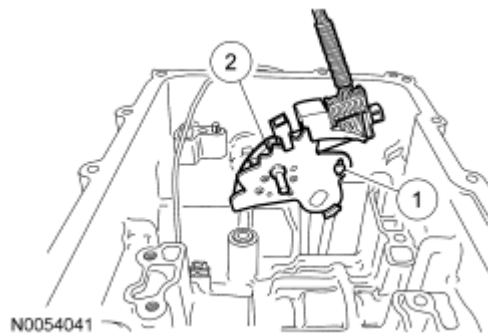
## INSTALLATION

1. Using the Manual Lever Shaft Seal Installer, install a new manual control lever shaft seal.



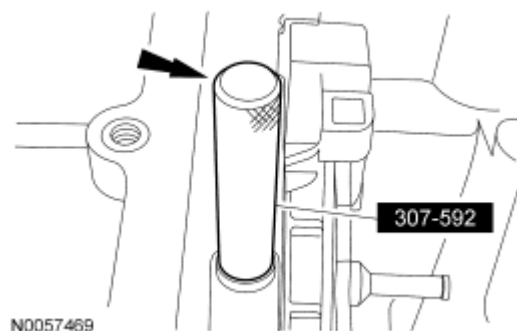
**Fig. 396: Installing New Manual Control Lever Shaft Seal Using Special Tool (307-581)**  
Courtesy of FORD MOTOR CO.

2. Install the TR sensor.
  1. Position the park pawl actuating rod in the TR sensor.
  2. Install the TR sensor in the transaxle case.



**Fig. 397: Identifying TR Sensor In Transaxle Case**  
Courtesy of FORD MOTOR CO.

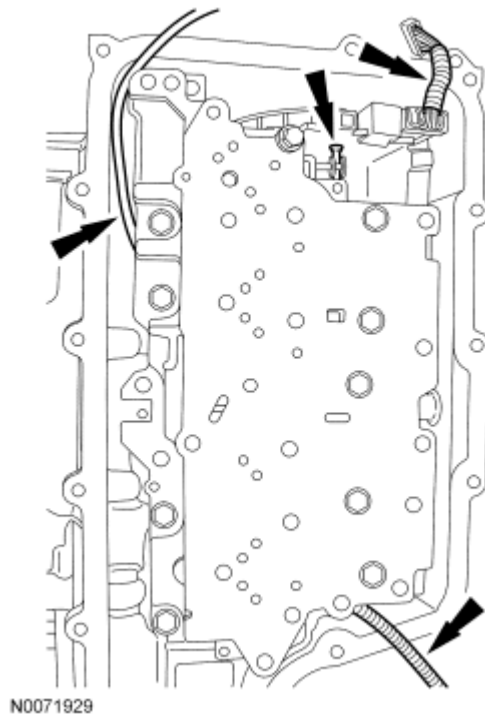
3. Using the Manual Retaining Pin Installer, install a new TR sensor locking pin.



**Fig. 398: Installing TR Sensor Locking Pin Using Special Tool (307-592)**  
Courtesy of FORD MOTOR CO.

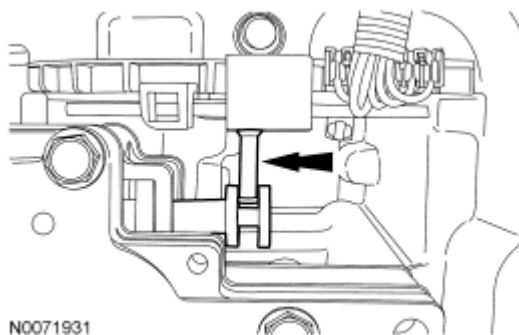
**NOTE:** Make sure that the manual pin (part of the TR sensor) is correctly installed in the manual valve.

4. Position the TSS, OSS and TR sensor wiring harnesses aside and install the main control valve body.



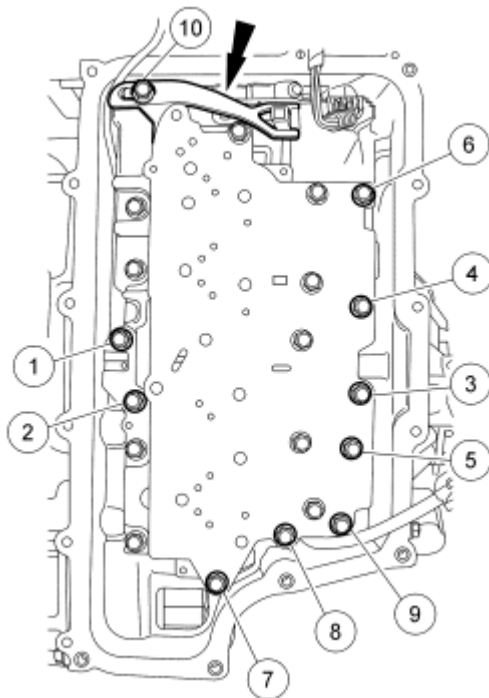
**Fig. 399: Locating TSS, OSS & TR Sensor Wiring Harnesses**  
Courtesy of FORD MOTOR CO.

5. Inspect the manual pin to make sure it is correctly installed in the manual control valve. If it is not, pull the valve body off the transaxle case. Correctly install the manual pin in the manual control valve and position the valve body in place.



**Fig. 400: Identifying Manual Pin**  
Courtesy of FORD MOTOR CO.

6. Install the TR sensor detent spring and the bolts. Tighten the bolts in the sequence shown.
  - Tighten to 12 Nm (106 lb-in).

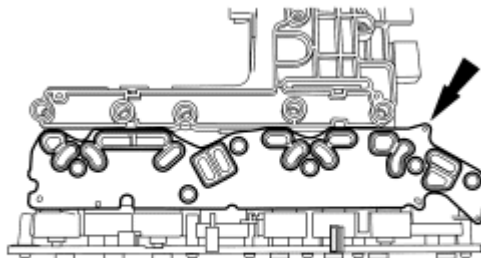


N0071930

**Fig. 401: Tightening TR Sensor Detent Spring Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

- NOTE:** Do not handle the solenoid body in the leadframe area or by the screens of the solenoid body filter or damage to the solenoid body can occur.
- NOTE:** Use care not to break the alignment tabs when installing the solenoid body filter. Damage to the transaxle will occur if the solenoid body is not correctly aligned.
- NOTE:** Make sure that the filter passage areas are clean of foreign material before installing the filter. Damage to the transaxle will occur if the filter passages are not clean.

7. Install a new solenoid body filter assembly by pushing it straight down on to the alignment tabs.



N0055016

**Fig. 402: Identifying Solenoid Body Filter Assembly**

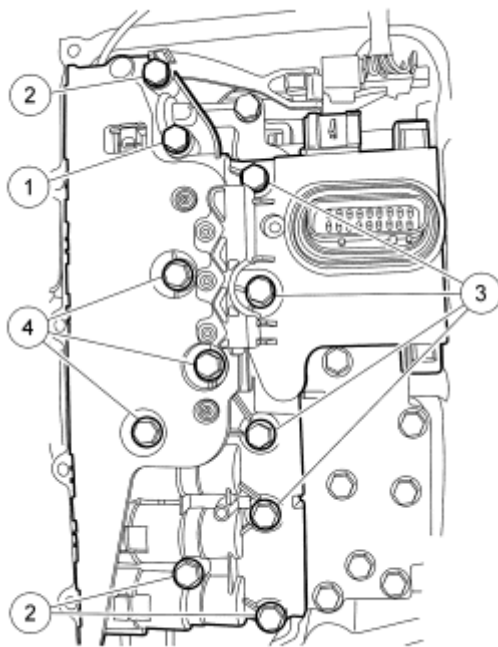
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure not to pinch the Turbine Shaft Speed (TSS), Output Shaft Speed (OSS) or Transmission Range (TR) sensor wiring harnesses when installing the solenoid body. Damage to the wiring harness will occur.

**NOTE:** Install the different length bolts in the locations noted during disassembly.

8. Install the solenoid body and the bolts.

1. 42 mm (1.65 in) bolt
2. 63 mm (2.48 in) bolts
3. 80 mm (3.14 in) bolts
4. 95 mm (3.74 in) bolts



N0057462

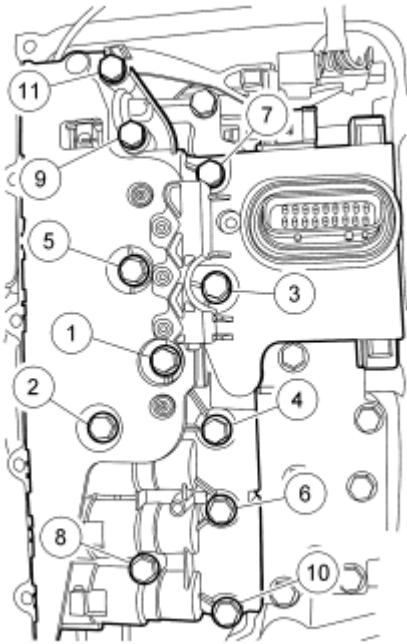
**Fig. 403: Locating Solenoid Body Bolts**

Courtesy of FORD MOTOR CO.

9. Tighten the solenoid body bolts in the sequence shown.

- Tighten to 12 Nm (106 lb-in).

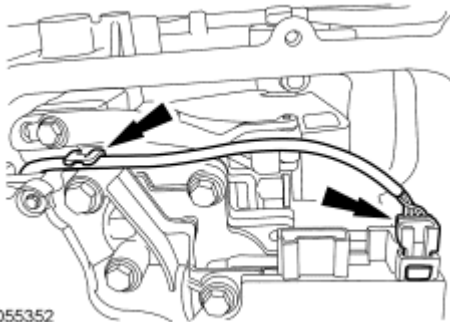




N0055351

**Fig. 404: Tightening Solenoid Body Bolts In Sequence**  
Courtesy of FORD MOTOR CO.

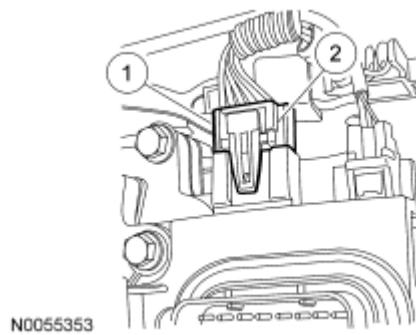
10. Route the OSS sensor wiring harness and connect the electrical connector.



N0055352

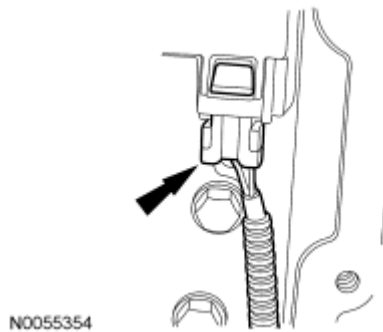
**Fig. 405: Locating OSS Sensor Wiring Harness & Electrical Connector**  
Courtesy of FORD MOTOR CO.

11. Connect the TR sensor electrical connector.
  1. Connect the electrical connector.
  2. Slide the locking tab over.



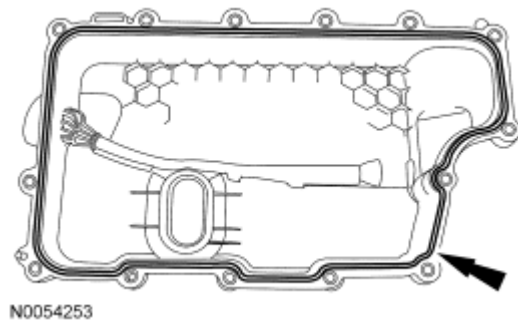
**Fig. 406: Identifying TR Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

12. Connect the TSS sensor electrical connector.



**Fig. 407: Identifying TSS Sensor Electrical Connector**  
Courtesy of FORD MOTOR CO.

13. Inspect the transaxle main control cover seal for damage and install new if necessary.



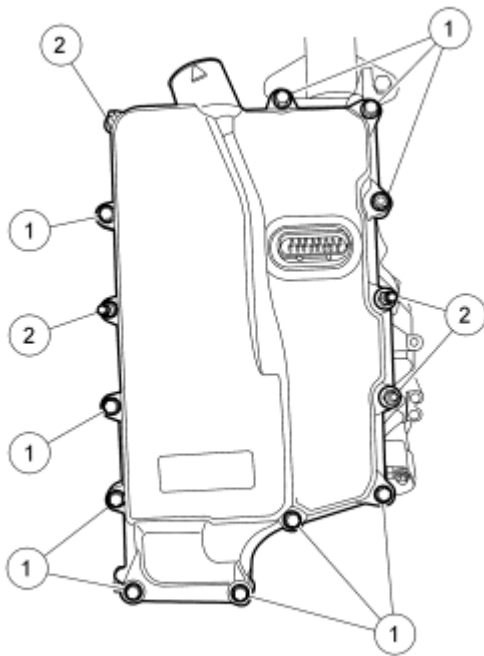
**Fig. 408: Inspecting Transaxle Main Control Cover Seal For Damage**  
Courtesy of FORD MOTOR CO.

**NOTE:** Inspect the 20-pin solenoid body connector seal to make sure that the seal is on the inside of the main control cover or a transmission fluid leak will occur resulting in transmission damage.

**NOTE:** Install the studbolts in the locations noted during disassembly.

14. Install the main control cover and loosely install the bolts.

1. Bolt location
2. Studbolt location

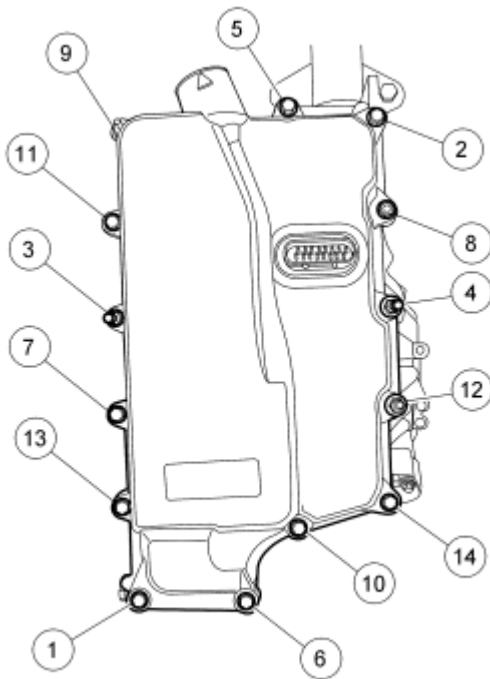


N0089295

**Fig. 409: Main Control Cover Bolts**  
Courtesy of FORD MOTOR CO.

15. Tighten the main control cover bolts in the sequence shown.

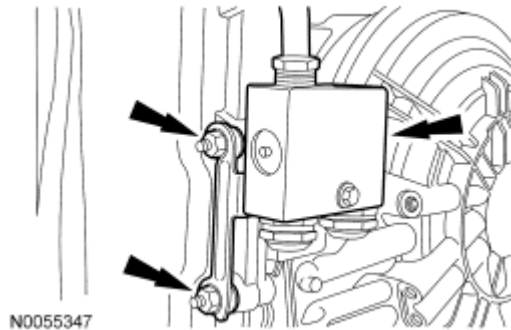
- Tighten to 12 Nm (106 lb-in).



N0089294

**Fig. 410: Main Control Cover Bolts Tightening Sequence**  
Courtesy of FORD MOTOR CO.

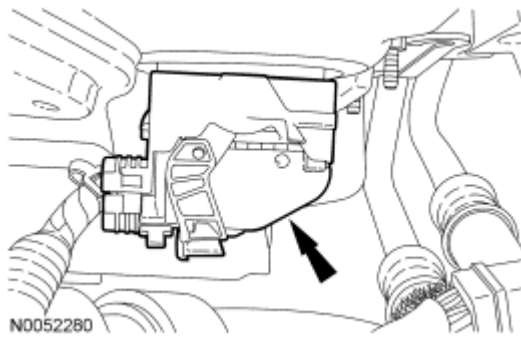
16. Position the transmission fluid cooler thermal bypass valve and transmission fluid cooler tube assembly in place and install the nuts.
  - Tighten to 9 Nm (80 lb-in).



N0055347

**Fig. 411: Identifying Transmission Fluid Cooler Tube Assembly & Nuts**  
Courtesy of FORD MOTOR CO.

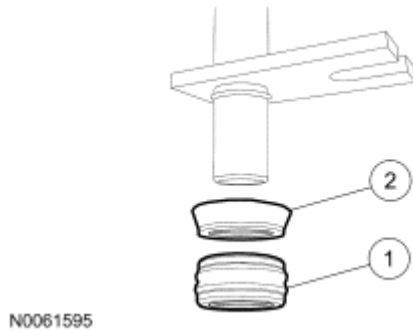
17. Connect the transaxle electrical connector.



**Fig. 412: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

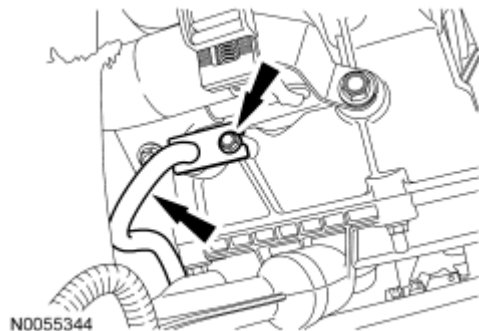
18. Inspect the transmission fluid cooler tube backing ring and seal for damage and install a new backing ring or seal if necessary. Lubricate the transmission fluid cooler tube seal with clean transmission fluid and install the backing ring and seal on the transmission fluid cooler tube.

Item	Part Number	Description
1	7D285	Seal
2	7J324	Backing ring



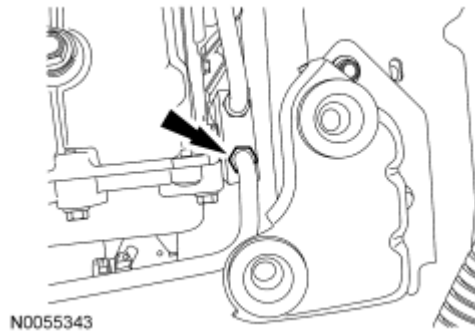
**Fig. 413: Identifying Transmission Fluid Cooler Tube Backing Ring & Seal**  
Courtesy of FORD MOTOR CO.

19. Position the transmission fluid cooler tube in place and install a new bolt.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 414: Identifying Transmission Fluid Cooler Tube Bolt**  
Courtesy of FORD MOTOR CO.

20. Tighten the transmission fluid cooler tube fitting.
- Tighten to 25 Nm (18 lb-ft).

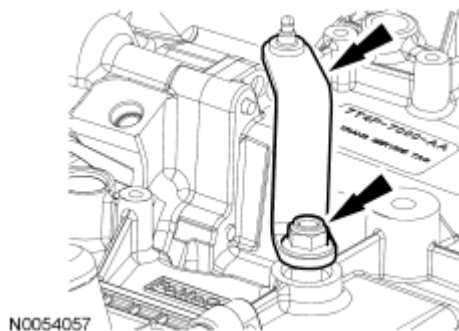


**Fig. 415: Identifying Transmission Fluid Cooler Tube Fitting From Thermal Bypass Valve**  
Courtesy of FORD MOTOR CO.

**NOTE:** Make sure that when installing the manual control lever it is fully seated onto the manual control lever shaft. Damage to the manual control lever shaft will occur and the lever will come loose.

**NOTE:** Make sure to hold the manual control lever while tightening the manual control lever nut or damage to the manual control lever and park components will occur.

21. Install the manual control lever and the nut.
- Tighten to 18 Nm (159 lb-in).



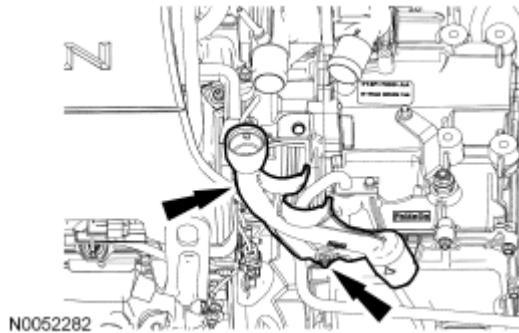
**Fig. 416: Identifying Manual Control Lever & Nut**  
Courtesy of FORD MOTOR CO.

22. Connect the selector lever cable end to the manual control lever.



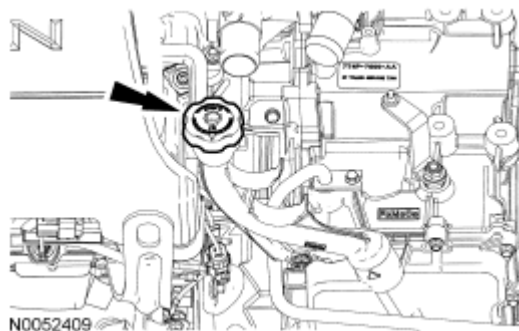
**Fig. 417: Locating Selector Lever Cable End From Manual Lever**  
Courtesy of FORD MOTOR CO.

23. Install the transmission fluid filler tube and the nut.
- Tighten to 11 Nm (97 lb-in).



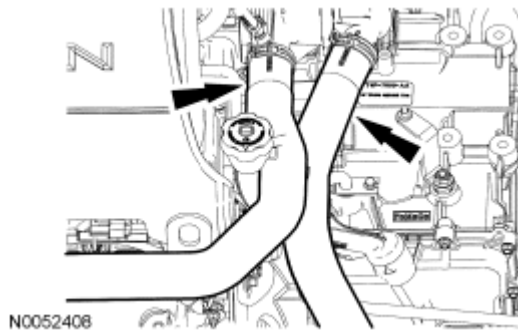
**Fig. 418: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

24. Install the transmission fluid level indicator.



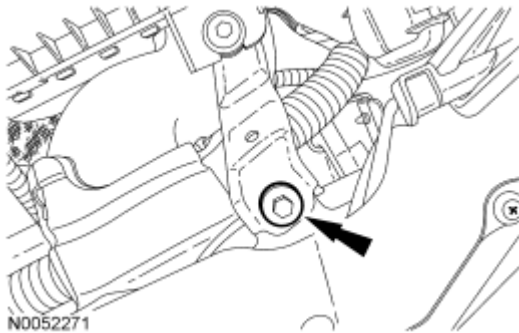
**Fig. 419: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

25. Route the coolant hoses to the correct position on the transmission fluid filler tube.



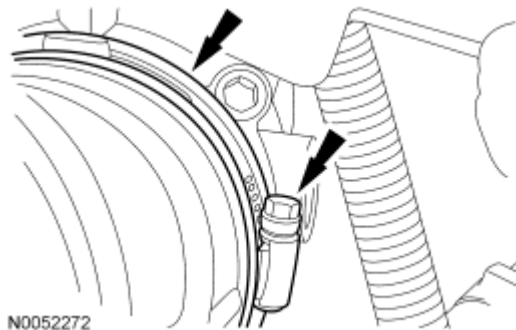
**Fig. 420: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

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



**Fig. 421: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

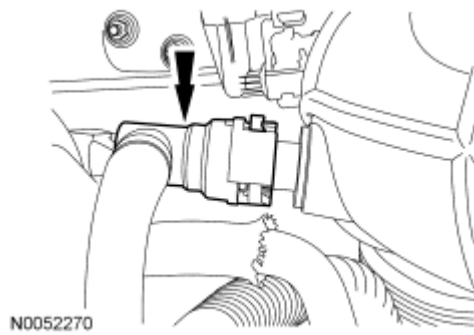
27. Tighten the ACL outlet pipe clamp at the TB.
- Tighten to 5 Nm (44 lb-in).



**Fig. 422: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

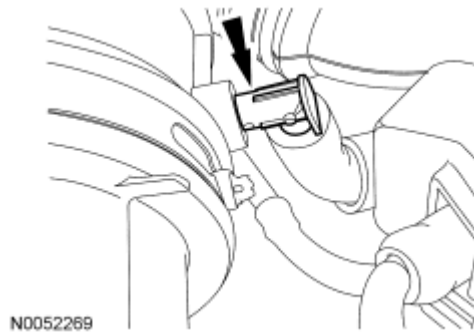
28. Connect the engine breather to the ACL assembly.





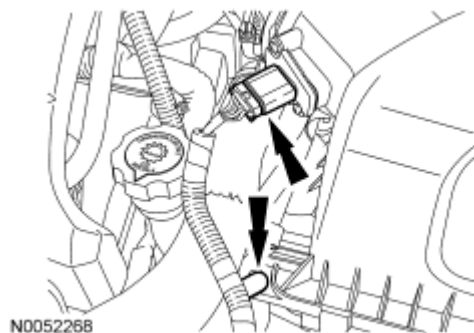
**Fig. 423: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

29. Connect the brake booster vacuum hose to the ACL assembly.



**Fig. 424: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

30. Connect the MAF sensor electrical connector and connect the electrical harness fastener.



**Fig. 425: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

31. Fill with clean transmission fluid to the correct level.



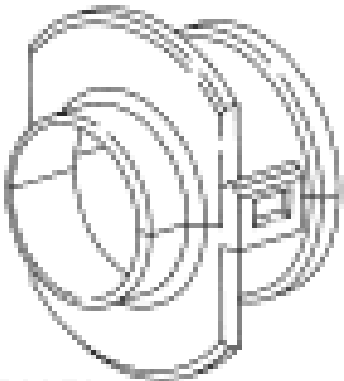
## REMOVAL

## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

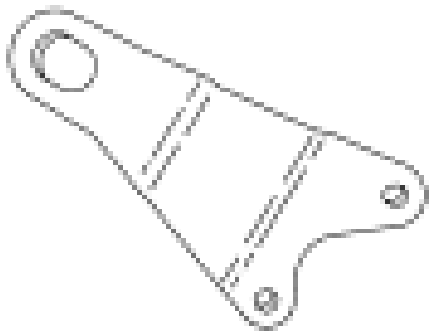

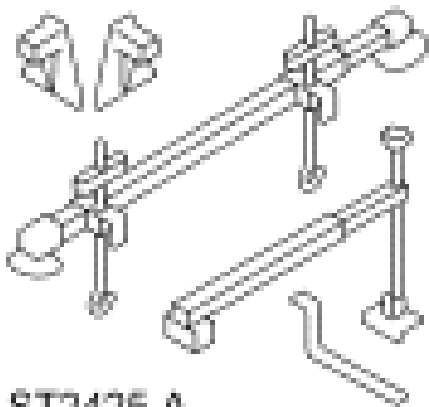
### TRANSAXLE

#### Special Tools

Illustration	Tool Name	Tool Number
 <b>ST3033-A</b>	Adapter, Transmission Jack	209-00152
 <b>ST2977-A</b>	Bar, Engine Spreader	303-1246
 <b>ST2670-A</b>	Disconnect Tool, Transmission Cooler Line	307-569
	Engine Lifting Bracket	303-1245

## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX

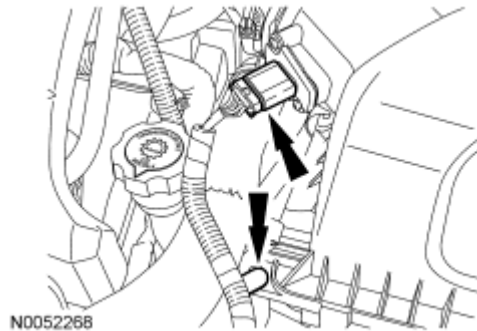
 ST2976A		
 ST1293-A	Powertrain Lift	014-00765
 ST2425-A	Support Bar, Engine	303-F072

### REMOVAL

#### All vehicles

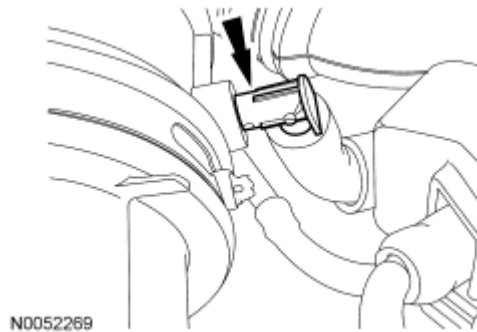
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** article.

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



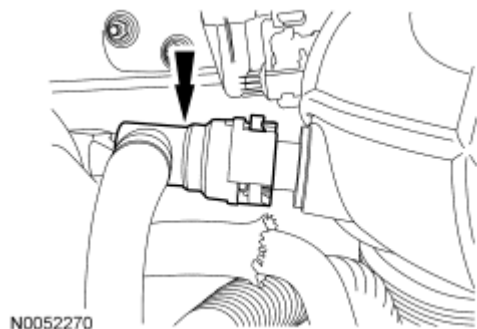
**Fig. 426: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

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



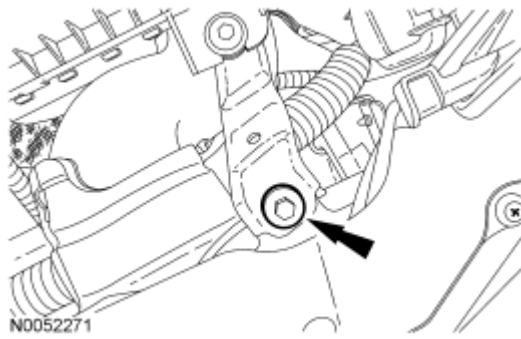
**Fig. 427: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

4. Disconnect the engine breather from the ACL assembly.



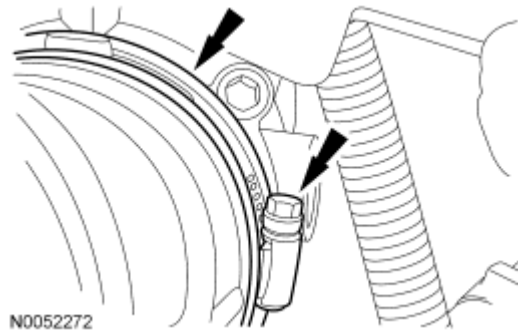
**Fig. 428: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

5. Remove the ACL assembly bracket bolt.



**Fig. 429: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

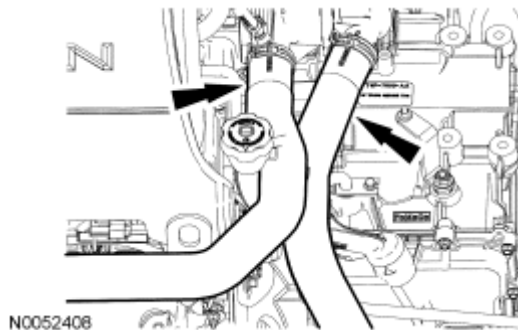
6. Loosen the ACL outlet pipe clamp at the Throttle Body (TB) and remove the ACL and ACL outlet pipe assembly.



**Fig. 430: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses do not need to be removed from the engine.

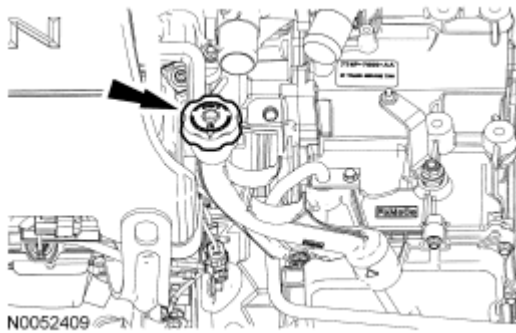
7. Remove the coolant hoses from the transmission fluid filler tube and position aside.



**Fig. 431: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

**NOTE:** The coolant hoses have been removed for clarity.

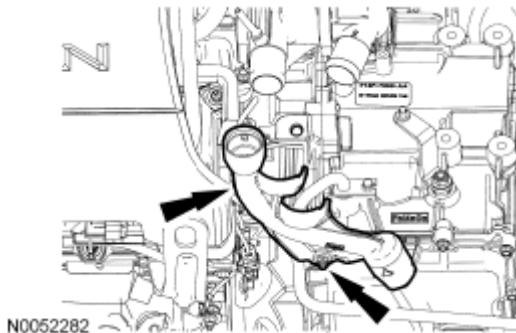
8. Remove the transmission fluid level indicator.



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

**NOTE:** The coolant hoses have been removed for clarity.

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



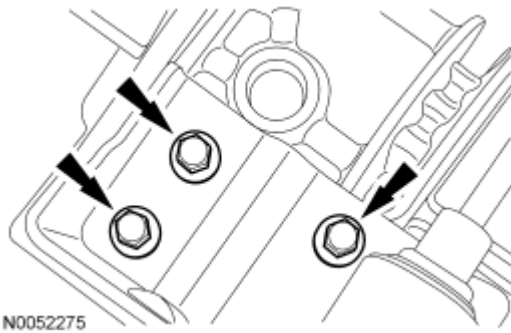
**Fig. 433: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

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



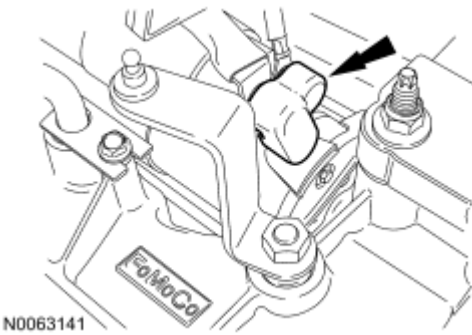
**Fig. 434: Locating Selector Lever Cable End From Manual Lever**  
Courtesy of FORD MOTOR CO.

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



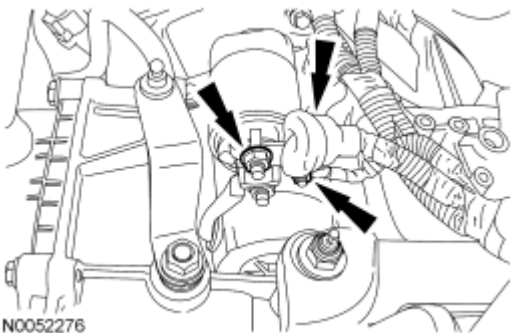
**Fig. 435: Identifying Selector Lever Cable Bracket Bolts**  
Courtesy of FORD MOTOR CO.

12. Remove the starter motor electrical terminal cover.



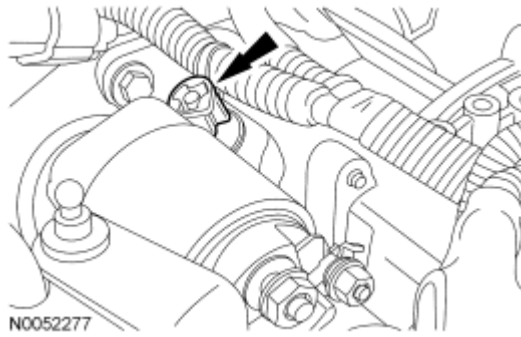
**Fig. 436: Locating Starter Motor Electrical Terminal Cover**  
Courtesy of FORD MOTOR CO.

13. Position the starter cable boot back and remove the starter terminals from the starter.



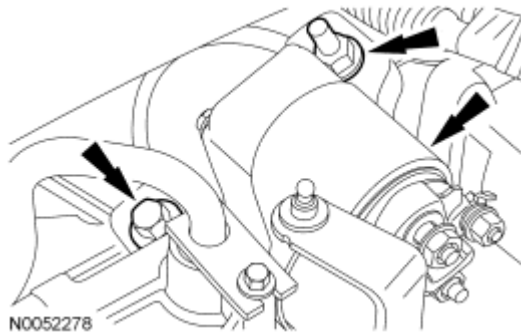
**Fig. 437: Identifying Wire Terminals From Starter**  
Courtesy of FORD MOTOR CO.

14. Disconnect the wiring harness fastener from the starter motor studbolt.



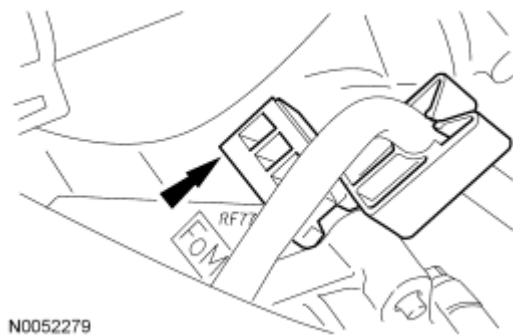
**Fig. 438: Identifying Wiring Harness Retainer From Starter Motor Stud Bolt**  
Courtesy of FORD MOTOR CO.

15. Remove the bolt, studbolt and the starter.



**Fig. 439: Identifying Bolt, Stud Bolt & Starter**  
Courtesy of FORD MOTOR CO.

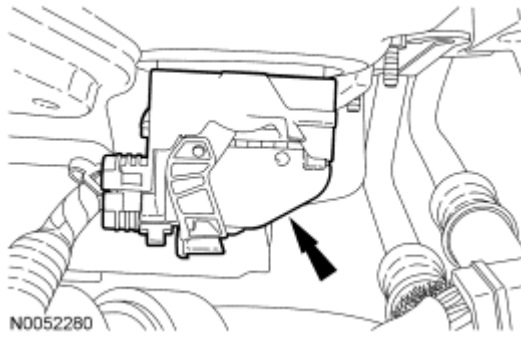
16. Disconnect the fuel hose routing clip from the transaxle stud and position the fuel hose aside.



**Fig. 440: Identifying Fuel Hose Routing Clip From Transaxle Stud**  
Courtesy of FORD MOTOR CO.

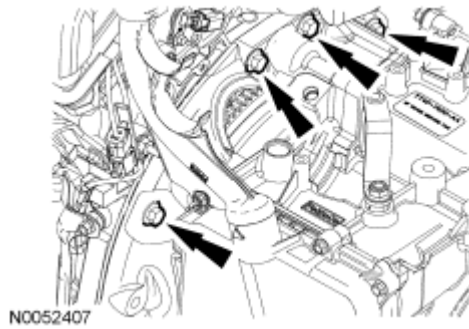
17. Disconnect the transaxle electrical connector.





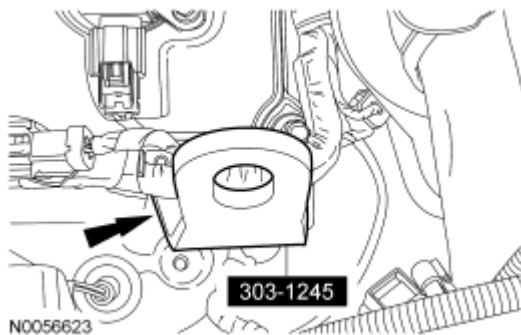
**Fig. 441: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

18. Remove the top 4 torque converter housing bolts.



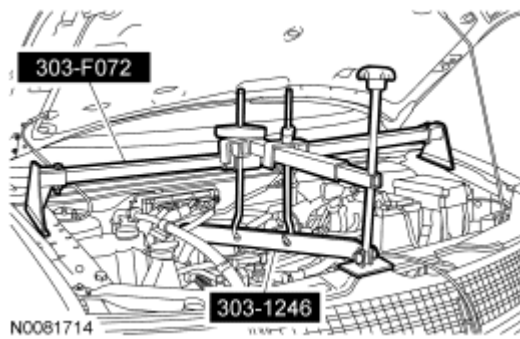
**Fig. 442: Locating Torque Converter Housing Bolts**  
Courtesy of FORD MOTOR CO.

19. Install the Engine Lifting Bracket on the LH cylinder head.



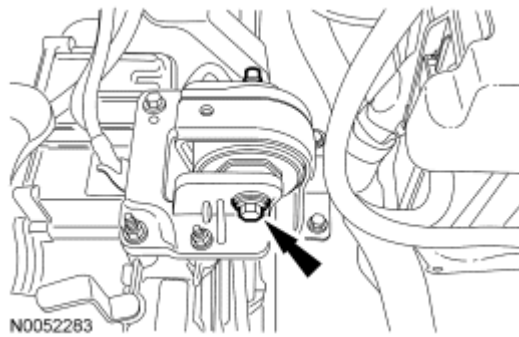
**Fig. 443: Special Tool (303-1245) On LH Cylinder Head**  
Courtesy of FORD MOTOR CO.

20. Install the Engine Support Bar and Engine Spreader Bar to support the engine.



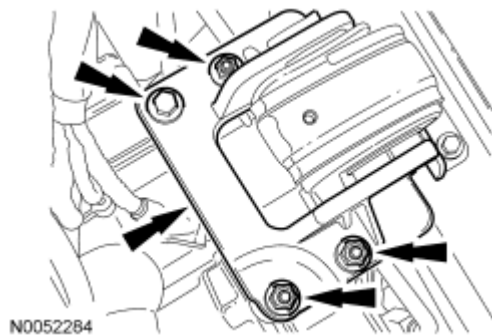
**Fig. 444: Engine Support Bar & Engine Spreader Bar**  
Courtesy of FORD MOTOR CO.

21. Remove the transaxle support insulator through bolt.



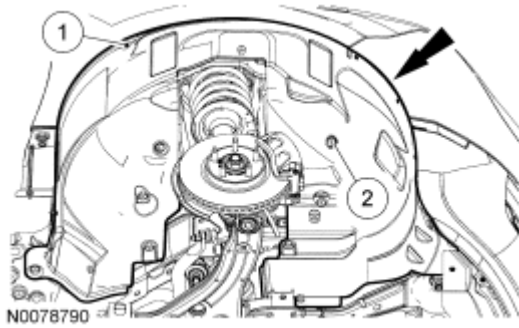
**Fig. 445: Identifying Transaxle Support Insulator Bolt**  
Courtesy of FORD MOTOR CO.

22. Remove the 3 nuts, the bolt and the transaxle support insulator bracket.



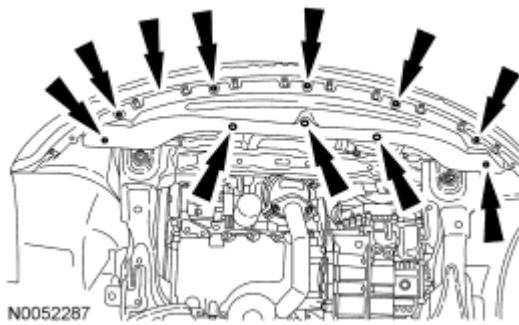
**Fig. 446: Identifying Transaxle Support Insulator Bracket, Nuts & Bolts**  
Courtesy of FORD MOTOR CO.

23. Remove the RH splash shield.
  1. Remove the screws.
  2. Remove the pushpin fasteners and the RH splash shield.



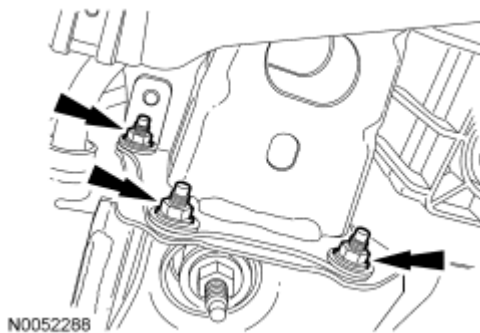
**Fig. 447: Locating Push Pin Fasteners & RH Splash Shield**  
Courtesy of FORD MOTOR CO.

24. Remove the 3 pushpin fasteners, the 8 screws and the front splash shield.



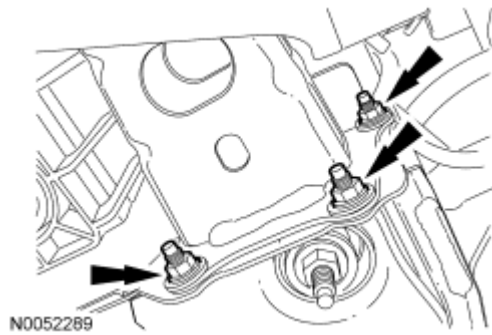
**Fig. 448: Locating Push Pin Fasteners & Front Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

25. Remove the 3 RH subframe-to-lower bumper nuts.



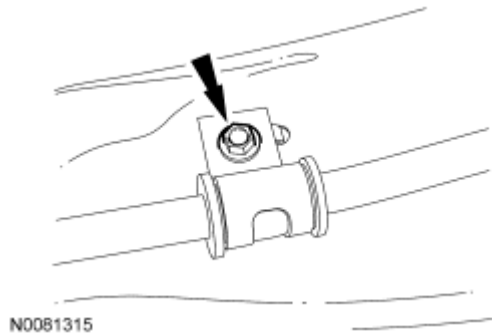
**Fig. 449: Locating RH Subframe-To-Lower Bumper Nuts**  
Courtesy of FORD MOTOR CO.

26. Remove the 3 LH subframe-to-lower bumper nuts and separate the front support from the subframe.



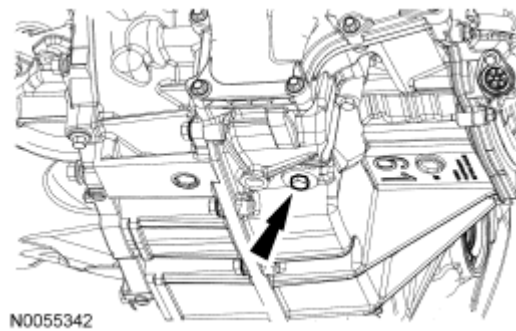
**Fig. 450: Locating LH Subframe-To-Lower Bumper Nuts**  
Courtesy of FORD MOTOR CO.

27. Remove the 3 power steering tube bracket bolts from the subframe and position the power steering tube aside.



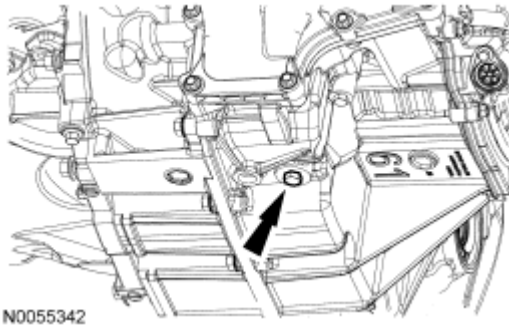
**Fig. 451: Power Steering Tube Bracket Bolt**  
Courtesy of FORD MOTOR CO.

28. Remove the transmission fluid drain plug and allow the transmission fluid to drain.



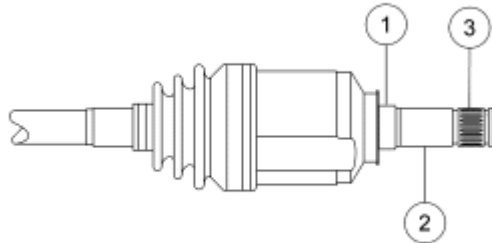
**Fig. 452: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

29. Install the transmission fluid drain plug.
- Tighten to 9 Nm (80 lb-in).



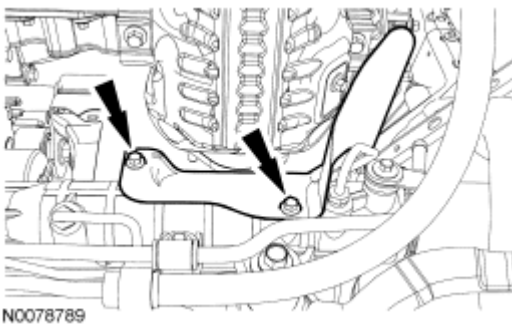
**Fig. 453: Locating Transmission Fluid Drain Plug**  
Courtesy of FORD MOTOR CO.

30. Remove the LH and RH front halfshafts. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
31. Inspect the halfshaft hubs for wear or damage and replace the halfshaft(s), if necessary.
  1. Inspect the differential seal surface.
  2. Inspect the halfshaft bushing surface. If this surface is damaged, inspect the halfshaft bushing for damage.
  3. Inspect the differential side gear splines.



**Fig. 454: Identifying Differential Side Gear Splines, Halfshaft Bushing & Differential Seal**  
Courtesy of FORD MOTOR CO.

32. Remove the bolts and the power steering rack heat shield.



**Fig. 455: Locating Power Steering Rack Heat Shield Bolts**

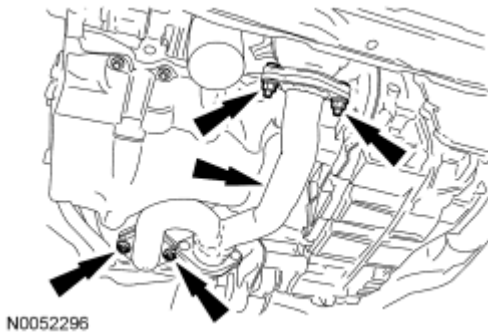
Courtesy of FORD MOTOR CO.

33. Loosen the Y-pipe clamp and disconnect the 2 exhaust hangers.



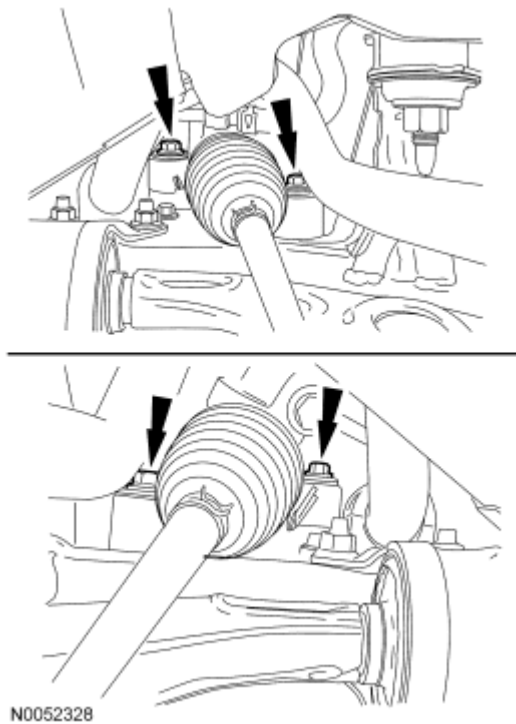
**Fig. 456: Locating Exhaust Flexible Pipe Clamp & Exhaust Hangers**  
Courtesy of FORD MOTOR CO.

34. Remove the 4 nuts and the Y-pipe assembly.



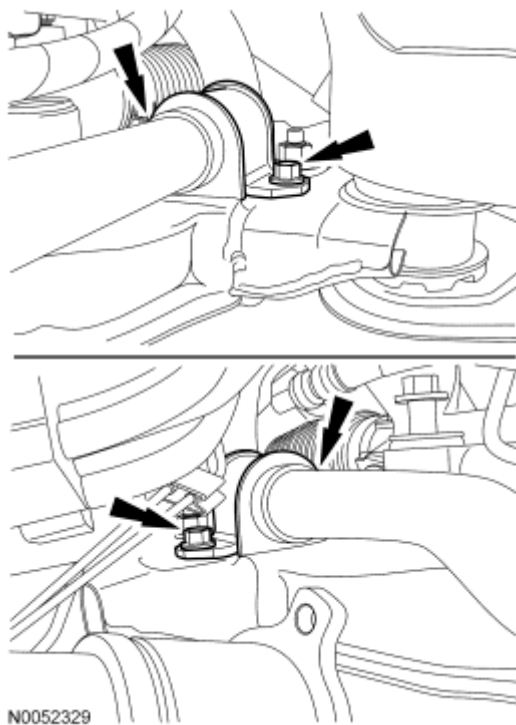
**Fig. 457: Locating Exhaust Flexible Pipe, Y-Pipe & Nuts**  
Courtesy of FORD MOTOR CO.

35. Remove the 4 bolts and position the steering rack aside, using a suitable length of mechanic's wire.



**Fig. 458: Locating Steering Rack Bolts**  
Courtesy of FORD MOTOR CO.

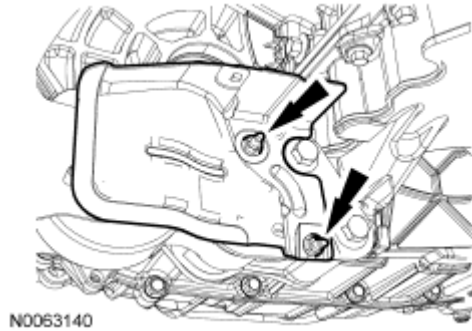
36. Remove the 4 bolts and position the sway bar aside, using a suitable length of mechanic's wire.



**Fig. 459: Locating Stabilizer Bar & Bolts**

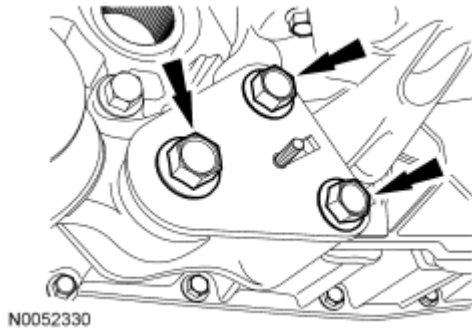
Courtesy of FORD MOTOR CO.

37. Remove the 2 nuts and the roll restrictor heat shield.



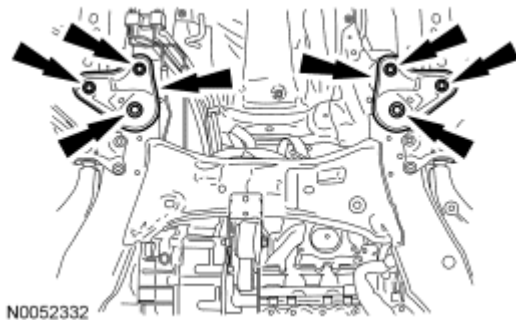
**Fig. 460: Locating Roll Restrictor Heat Shield Nuts**  
Courtesy of FORD MOTOR CO.

38. Remove the 3 bolts from the roll restrictor bracket.



**Fig. 461: Locating Roll Restrictor-To-Transaxle Bracket Plate Bolts**  
Courtesy of FORD MOTOR CO.

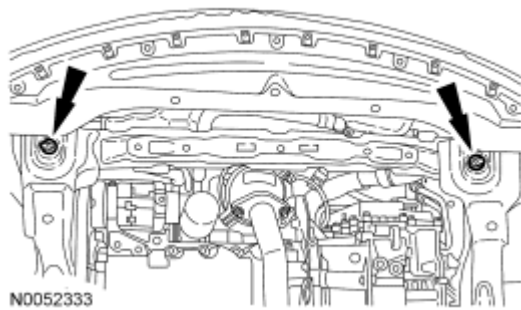
39. Support the subframe using the Powertrain Lift.  
40. Remove the 2 nuts, 4 bolts and the subframe support brackets.



**Fig. 462: Locating Subframe Support Brackets, Nuts & Bolts**  
Courtesy of FORD MOTOR CO.

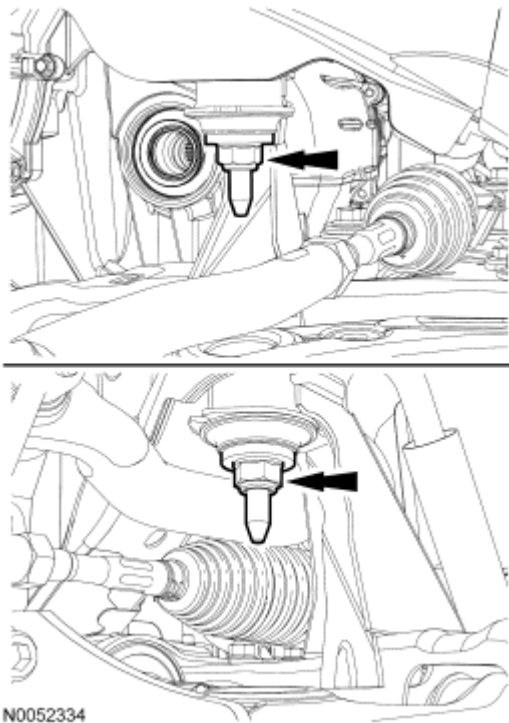


41. Remove the 2 front subframe nuts.



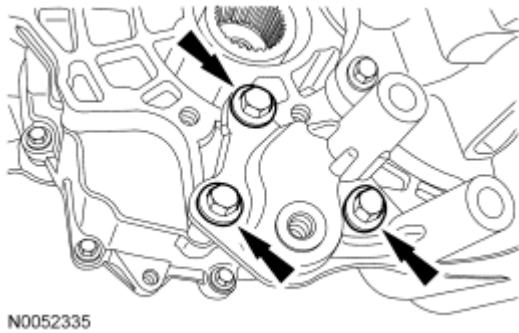
**Fig. 463: Locating Front Subframe Nuts**  
Courtesy of FORD MOTOR CO.

42. Remove the 2 middle subframe nuts and remove the subframe.



**Fig. 464: Locating Middle Subframe Nuts**  
Courtesy of FORD MOTOR CO.

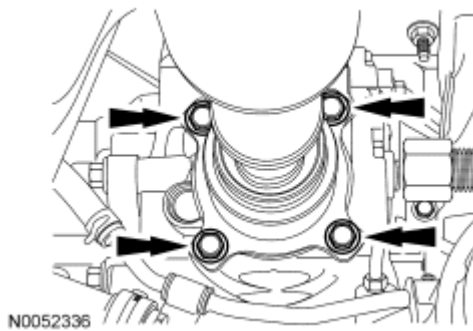
43. Remove the 3 bolts and the roll restrictor bracket.



**Fig. 465: Locating Transaxle Bracket Bolts**  
Courtesy of FORD MOTOR CO.

#### **AWD vehicles**

44. Index-mark the driveshaft, remove the 4 bolts and position the driveshaft aside.



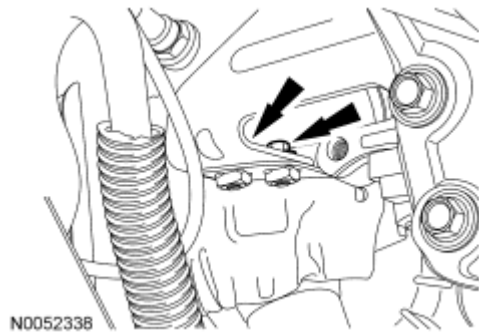
**Fig. 466: Locating Driveshaft Aside Bolts**  
Courtesy of FORD MOTOR CO.

45. Disconnect the RH catalyst monitor electrical connector.



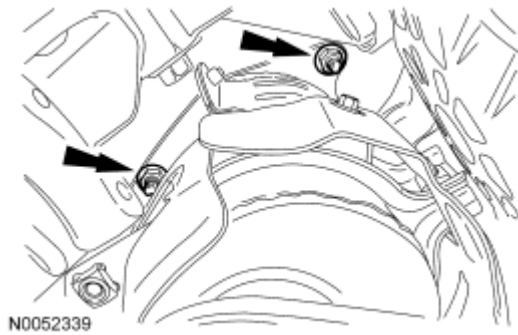
**Fig. 467: Identifying RH Catalyst Monitor Electrical Connector**  
Courtesy of FORD MOTOR CO.

46. Remove the 2 catalytic converter support bracket bolts.



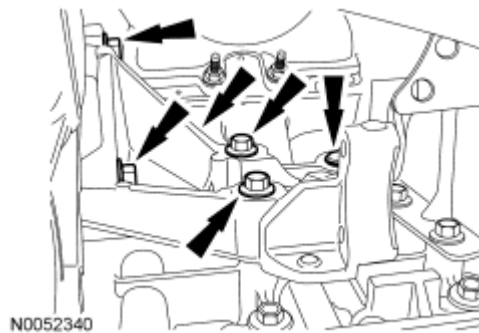
**Fig. 468: Locating Catalytic Converter Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

47. Remove the 4 RH catalytic converter nuts and the RH catalytic converter.



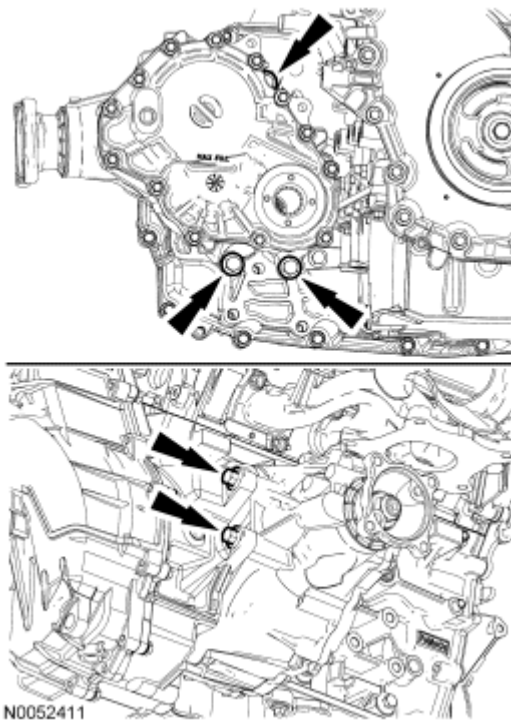
**Fig. 469: Locating RH Catalytic Converter Nuts**  
Courtesy of FORD MOTOR CO.

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



**Fig. 470: Locating Power Transfer Unit (PTU) Support Bracket & Bolts**  
Courtesy of FORD MOTOR CO.

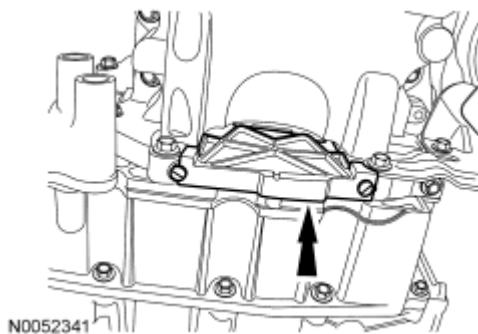
49. Remove the 5 bolts and the PTU.



**Fig. 471: Identifying PTU & Bolts**  
Courtesy of FORD MOTOR CO.

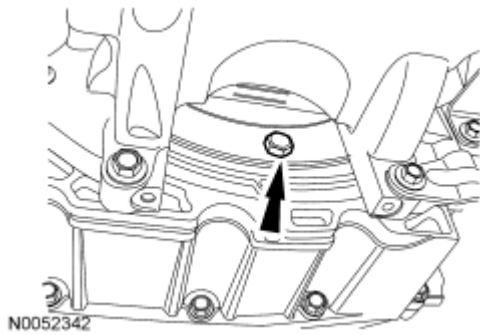
#### **All vehicles**

50. Remove the 2 fasteners and the inspection cover.



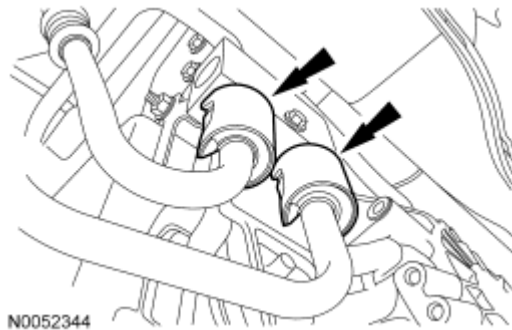
**Fig. 472: Locating Oil Fasteners On Inspection Cover**  
Courtesy of FORD MOTOR CO.

51. Remove and discard the 3 torque converter bolts.



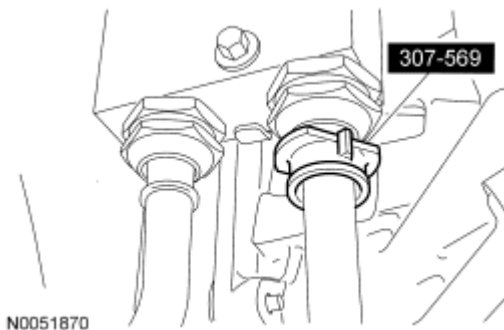
**Fig. 473: Locating Torque Converter Bolts**  
Courtesy of FORD MOTOR CO.

52. Remove the 2 secondary latches from the transmission fluid cooler tubes at the transmission fluid cooler thermal bypass valve.



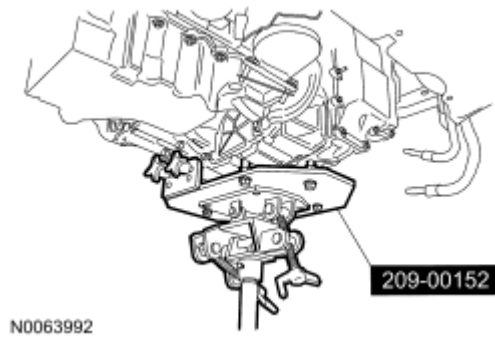
**Fig. 474: Locating Secondary Latches On Transmission Fluid Cooler Tubes**  
Courtesy of FORD MOTOR CO.

53. Using the Transmission Cooler Line Disconnect Tool, disconnect the transmission fluid cooler tubes from the transmission fluid cooler thermal bypass valve.



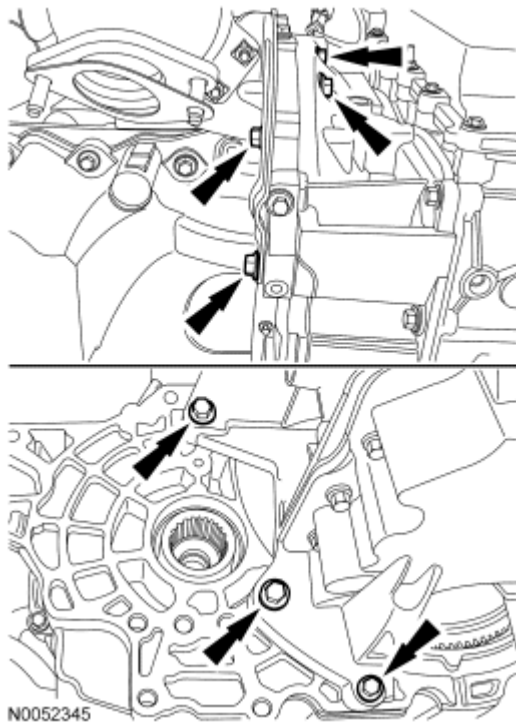
**Fig. 475: Disconnecting Transmission Cooling Tubes Using Special Tool (307-569)**  
Courtesy of FORD MOTOR CO.

54. Using the Transmission Jack Adapter and a suitable transmission jack, support the transaxle.



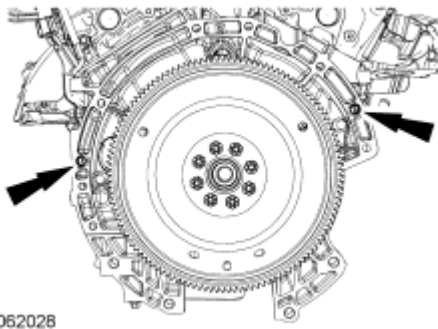
**Fig. 476: Supporting Transaxle Using Special Tool (209-00152) & A Suitable Transmission Jack**  
Courtesy of FORD MOTOR CO.

55. Remove the 7 torque converter housing bolts and remove the transaxle from the vehicle.



**Fig. 477: Locating torque converter housing bolts**  
Courtesy of FORD MOTOR CO.

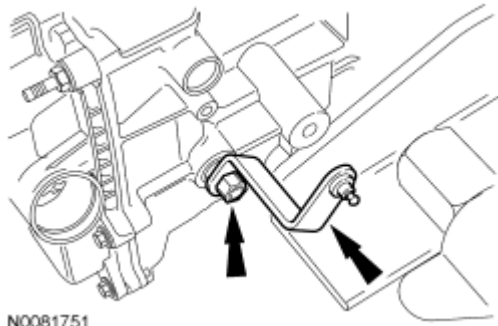
56. Inspect the torque converter housing mating surface to make sure that the dowel pins did not come out of the engine block when the transaxle was removed. If the dowel pin is stuck in the torque converter housing, remove the dowel pin from the torque converter housing.



N0062028

**Fig. 478: Locating dowl pin from torque converter housing**  
Courtesy of FORD MOTOR CO.

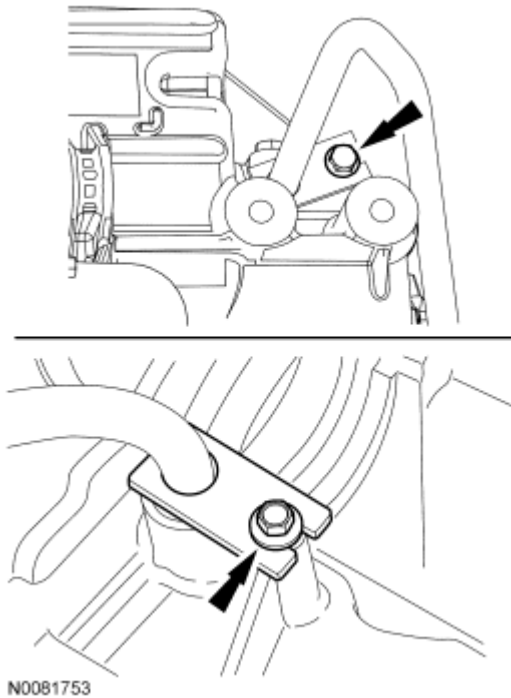
57. Remove manual control lever.



N0081751

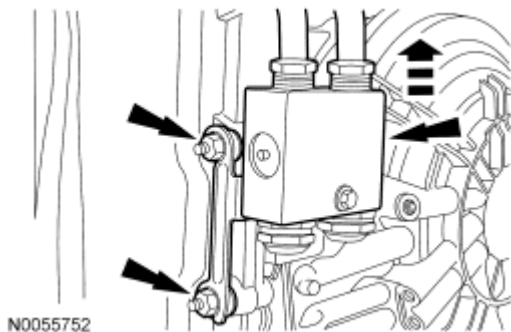
**Fig. 479: Manual Control Lever**  
Courtesy of FORD MOTOR CO.

58. Remove and discard the transmission fluid cooler tube bolts.



**Fig. 480: Transmission Fluid Cooler Tube Bolts**  
Courtesy of FORD MOTOR CO.

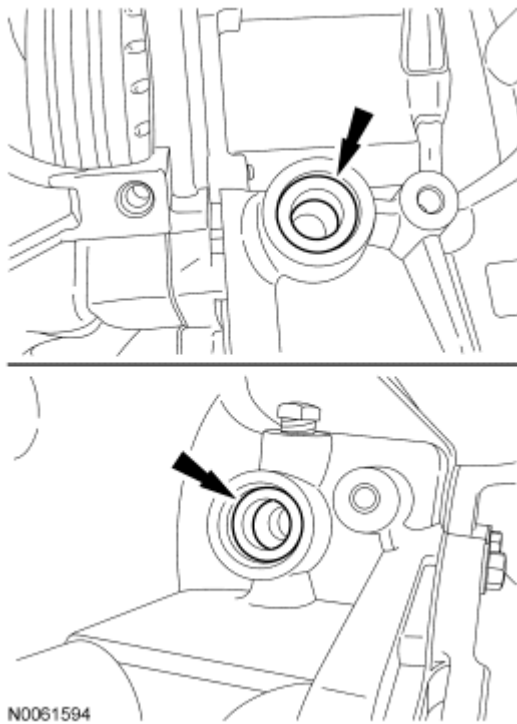
59. Remove the 2 transmission fluid cooler thermal bypass valve bracket nuts, pull the transmission fluid cooler thermal bypass valve and the transmission fluid cooler tubes straight up and remove the assembly from the transaxle.



**Fig. 481: Removing Nuts & Pulling Transmission Fluid Cooler Thermal Bypass Valve & Transmission Fluid Cooler Tubes Straight Up**  
Courtesy of FORD MOTOR CO.

60. Inspect the transaxle case to make sure that the transmission fluid cooler tube seals and backing rings were removed with the transmission fluid cooler tubes and are not stuck in the transaxle case. If the transmission fluid cooler tube seals or backing rings are stuck in the transaxle case, remove the seals and backing rings.





**Fig. 482: Locating Transmission Fluid Cooler Tube Seals & Backing Rings**  
Courtesy of FORD MOTOR CO.

61. If the transaxle is to be overhauled or if installing a new transaxle, carry out transmission fluid cooler backflushing and cleaning. For additional information, refer to **Transmission Fluid Cooler Backflushing and Cleaning**.
62. If a replacement transaxle assembly is being installed or a new solenoid body is installed, the PCM will have to be reflashed with a new solenoid body strategy and identification data file. For additional information, refer to **Solenoid Body Strategy**.

## INSTALLATION

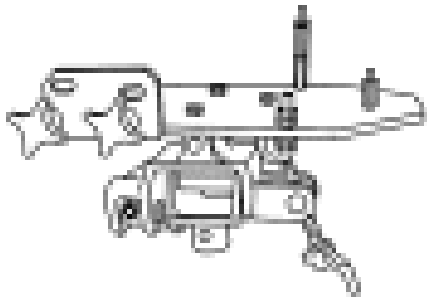
### TRANSAXLE

#### Special Tools

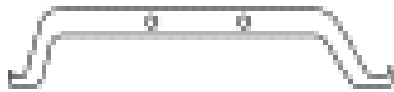
Illustration	Tool Name	Tool Number
	Adapter, Transmission Jack	209-00152

## 2008 Ford Edge SE

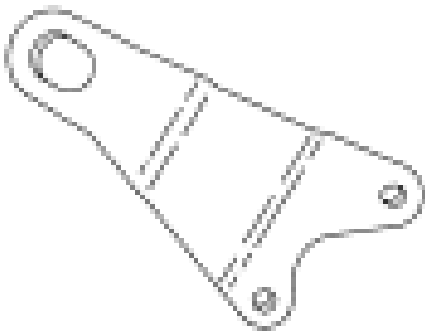
2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX



**ST3033-A**



**ST2977-A**



**ST2976A**

Bar, Engine Spreader

303-1246

Eye, Engine Lift

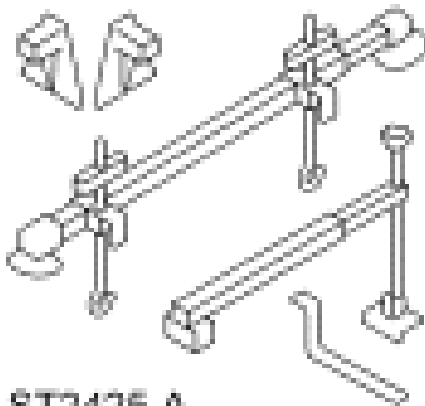
303-1245

Support Bar, Engine

303-F072

## 2008 Ford Edge SE

2008 TRANSMISSIONS Automatic Transaxle/Transmission - Diagnostics, Servicing, & Removal & Installation - 6F50 - Edge & MKX



ST2425-A

### Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B

### INSTALLATION

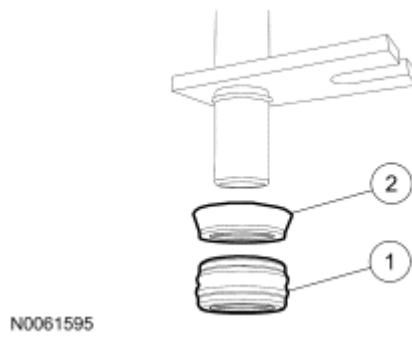
#### All vehicles

**NOTE:** Prior to installation of a new or overhauled transaxle, the transmission fluid cooler tubes must be cleaned, otherwise transaxle failure can occur.

**NOTE:** Prior to installation of a new or overhauled transaxle, flush out the cooler and cooler lines. For additional information, refer to Transmission Fluid Cooler Backflushing and Cleaning.

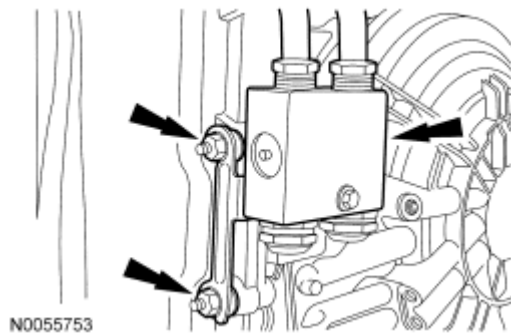
1. Inspect the transmission fluid cooler tube backing rings and seals for damage and install a new backing rings or seals if necessary. Lubricate the transmission fluid cooler tube seals with clean automatic transmission fluid and install the backing rings and seals on the transmission fluid cooler tube.

Item	Part Number	Description
1	7D285	Seal
2	7J324	Backing ring



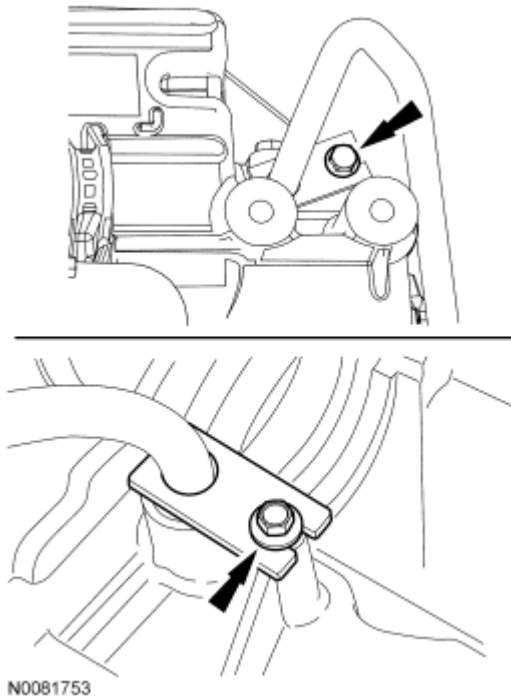
**Fig. 483: Identifying Transmission Fluid Cooler Tube Backing Ring & Seal**  
Courtesy of FORD MOTOR CO.

2. Position the transmission fluid cooler thermal bypass valve and transmission fluid cooler tube assembly in place and install the transmission fluid cooler thermal bypass valve bracket nuts.
  - Tighten to 9 Nm (80 lb-in).



**Fig. 484: Identifying Transmission Fluid Cooler Tube Assembly & Nuts**  
Courtesy of FORD MOTOR CO.

3. Install new transmission fluid cooler tube bolts.
  - Tighten to 9 Nm (80 lb-in).



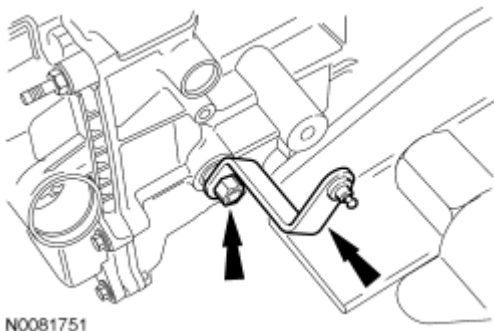
**Fig. 485: Transmission Fluid Cooler Tube Bolts**  
Courtesy of FORD MOTOR CO.

4. Lubricate the torque converter pilot hub with grease and install the torque converter into the transaxle.

**NOTE:** Make sure that when installing the manual control lever it is fully seated onto the manual control lever shaft or damage to the manual control lever shaft will occur and the lever will come loose.

**NOTE:** Make sure to hold the manual control lever while tightening the manual control lever nut or damage to the manual control lever and park components will occur.

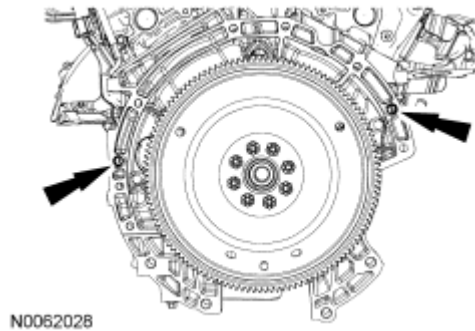
5. Install the manual control lever and nut.
  - Tighten to 18 Nm (159 lb-in).



**Fig. 486: Manual Control Lever**  
Courtesy of FORD MOTOR CO.

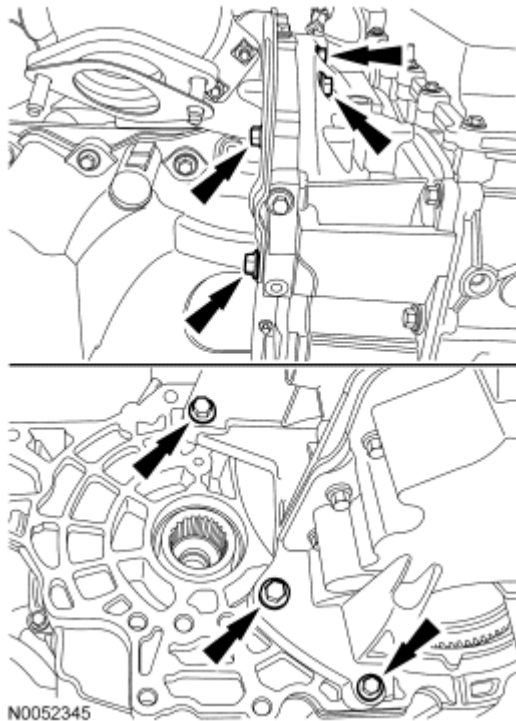
**NOTE:** If the transaxle is not positioned on the dowel pins, damage to the transaxle can occur.

6. If the dowel pins were pulled out of the engine block during removal, install new dowel pins in the engine block.



**Fig. 487: Locating dowel pin from torque converter housing**  
Courtesy of FORD MOTOR CO.

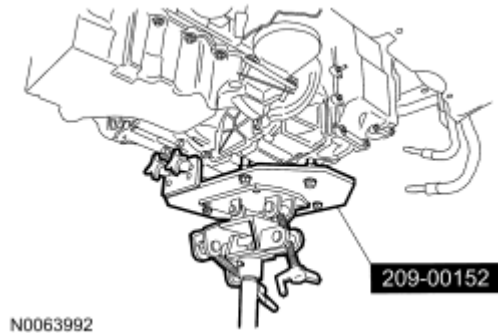
7. Position the transaxle in place and install the 7 torque converter housing bolts.
  - Tighten to 48 Nm (35 lb-ft).



**Fig. 488: Locating torque converter housing bolts**

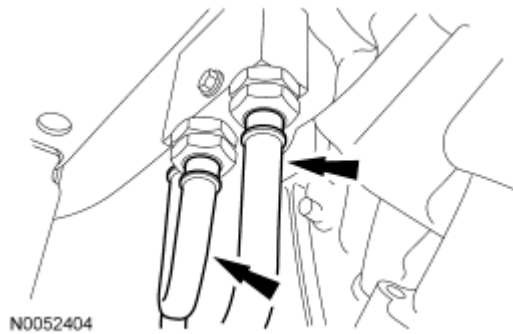
Courtesy of FORD MOTOR CO.

8. Remove the Transmission Jack Adapter from the transaxle.



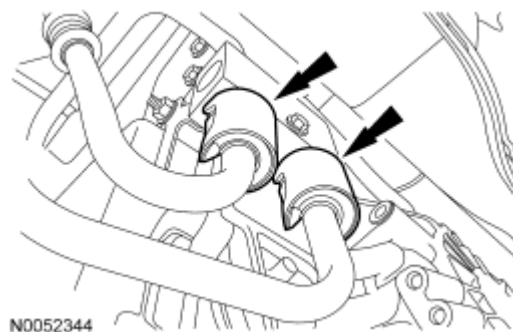
**Fig. 489: Supporting Transaxle Using Special Tool (209-00152) & A Suitable Transmission Jack**  
Courtesy of FORD MOTOR CO.

9. Install the transmission fluid cooler tubes in the transmission fluid cooler thermal bypass valve.



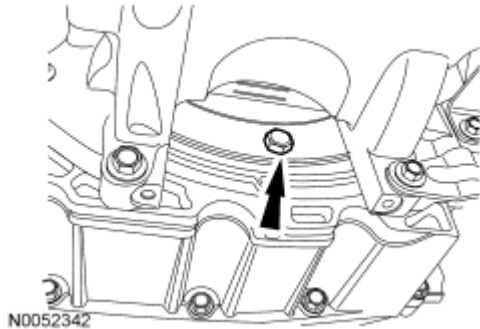
**Fig. 490: Locating Transmission Fluid Cooler Tubes**  
Courtesy of FORD MOTOR CO.

10. Install the 2 secondary latches on the transmission fluid cooler tubes at the transmission fluid cooler thermal bypass valve.



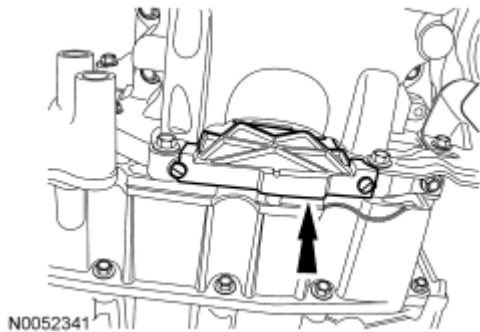
**Fig. 491: Locating Secondary Latches On Transmission Fluid Cooler Tubes**  
Courtesy of FORD MOTOR CO.

11. Install 3 new torque converter bolts.
  - Tighten to 55 Nm (41 lb-ft).



**Fig. 492: Locating Torque Converter Bolts**  
Courtesy of FORD MOTOR CO.

12. Install the inspection cover and the 2 fasteners.

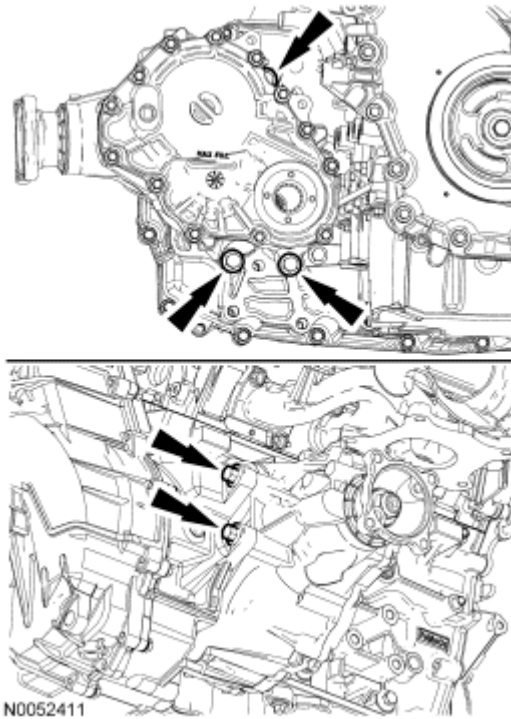


**Fig. 493: Locating Oil Fasteners On Inspection Cover**  
Courtesy of FORD MOTOR CO.

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

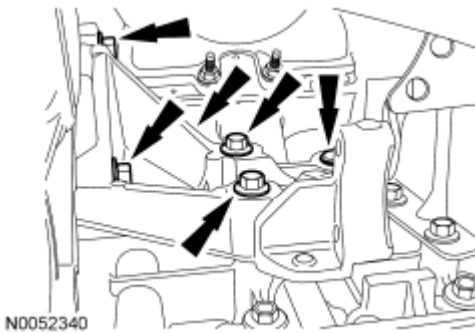
13. Position the Power Transfer Unit (PTU) in place and install the 5 PTU-to-transaxle bolts.
  - Tighten to 90 Nm (66 lb-ft).





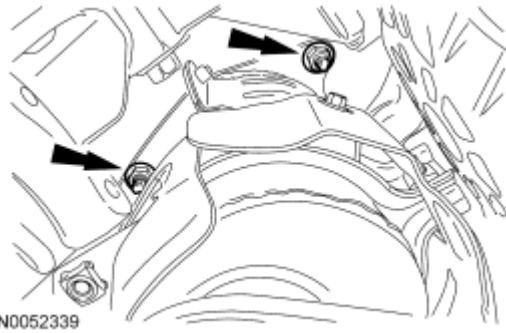
**Fig. 494: Identifying PTU & Bolts**  
Courtesy of FORD MOTOR CO.

14. Position the PTU support bracket in place and install the 5 bolts.
  - Tighten to 70 Nm (52 lb-ft).



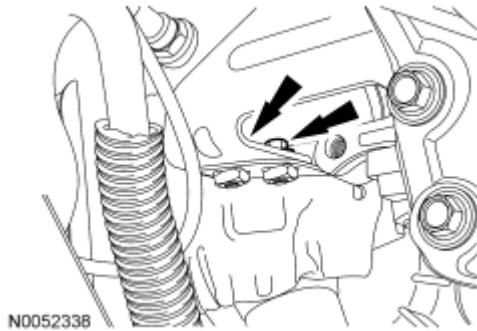
**Fig. 495: Locating Power Transfer Unit (PTU) Support Bracket & Bolts**  
Courtesy of FORD MOTOR CO.

15. Position the RH catalytic converter in place and install the 4 nuts.
  - Tighten to 40 Nm (30 lb-ft).



**Fig. 496: Locating RH Catalytic Converter Nuts**  
Courtesy of FORD MOTOR CO.

16. Install the 2 RH catalytic converter support bracket bolts.
  - Tighten to 20 Nm (177 lb-in).



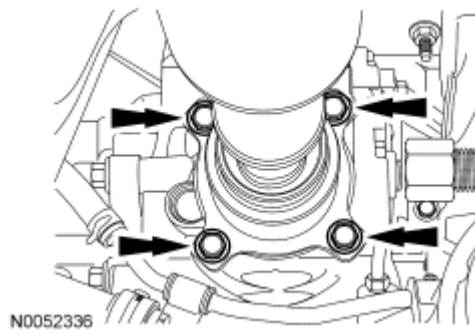
**Fig. 497: Locating Catalytic Converter Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

17. Connect the RH catalyst monitor electrical connector.



**Fig. 498: Identifying RH Catalyst Monitor Electrical Connector**  
Courtesy of FORD MOTOR CO.

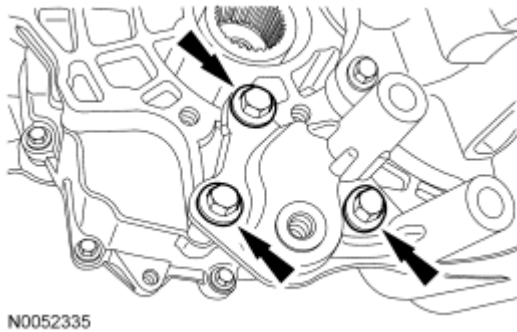
18. Line up the index marks on the rear driveshaft to the index marks on the PTU flange made during removal and install the 4 bolts.
  - Tighten to 70 Nm (52 lb-ft).



**Fig. 499: Locating Driveshaft Aside Bolts**  
Courtesy of FORD MOTOR CO.

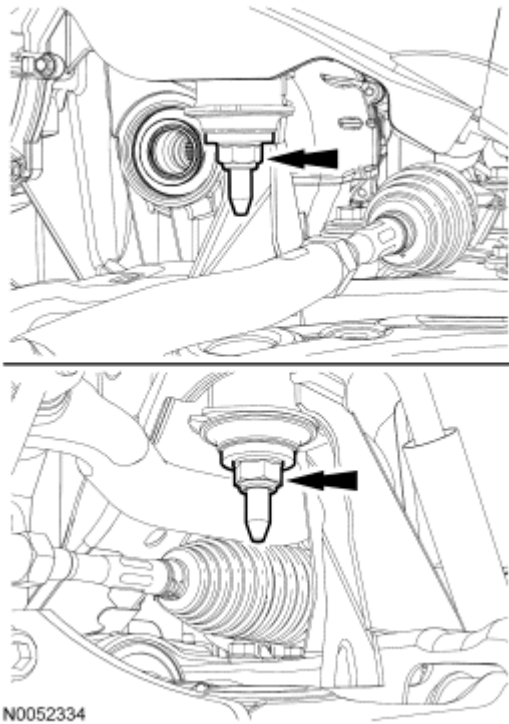
**All vehicles**

19. Position the roll restrictor bracket on the transaxle and install the 3 bolts.
  - Tighten to 90 Nm (66 lb-ft).



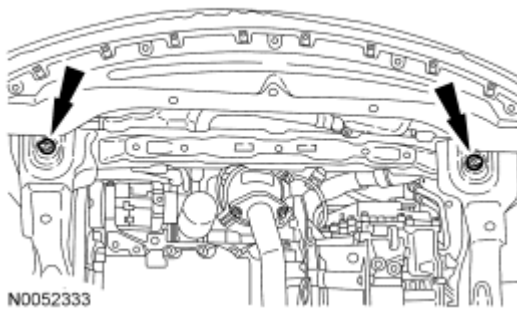
**Fig. 500: Locating Transaxle Bracket Bolts**  
Courtesy of FORD MOTOR CO.

20. Position the subframe in place and install the 2 middle nuts.
  - Tighten to 150 Nm (111 lb-ft).



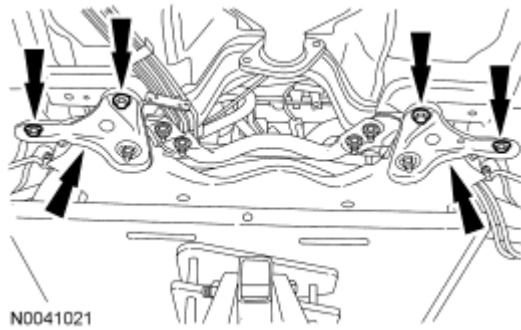
**Fig. 501: Locating Middle Subframe Nuts**  
Courtesy of FORD MOTOR CO.

21. Install the 2 front subframe nuts.
  - Tighten to 150 Nm (111 lb-ft).



**Fig. 502: Locating Front Subframe Nuts**  
Courtesy of FORD MOTOR CO.

22. Position the subframe support brackets in place and loosely install the bolts.



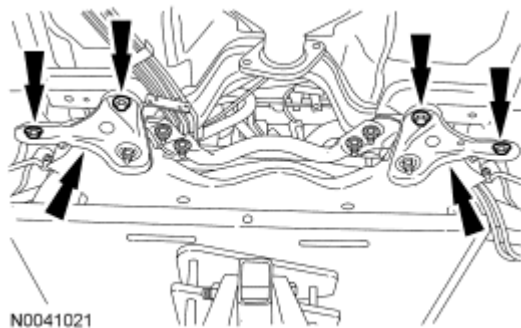
**Fig. 503: Locating Subframe Support Brackets And Bolts**  
Courtesy of FORD MOTOR CO.

23. Install the rear subframe nuts.
- Tighten to 150 Nm (111 lb-ft).



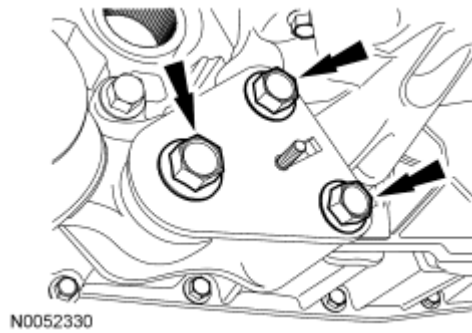
**Fig. 504: Locating Rear Subframe Nuts**  
Courtesy of FORD MOTOR CO.

24. Tighten the subframe support bracket bolts.
- Tighten to 103 Nm (76 lb-ft).



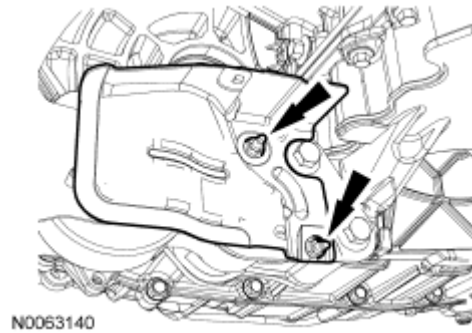
**Fig. 505: Locating Subframe Support Brackets And Bolts**  
Courtesy of FORD MOTOR CO.

25. Position the roll restrictor in place, install the bracket and the 3 roll restrictor bolts.
- Tighten to 90 Nm (66 lb-ft).



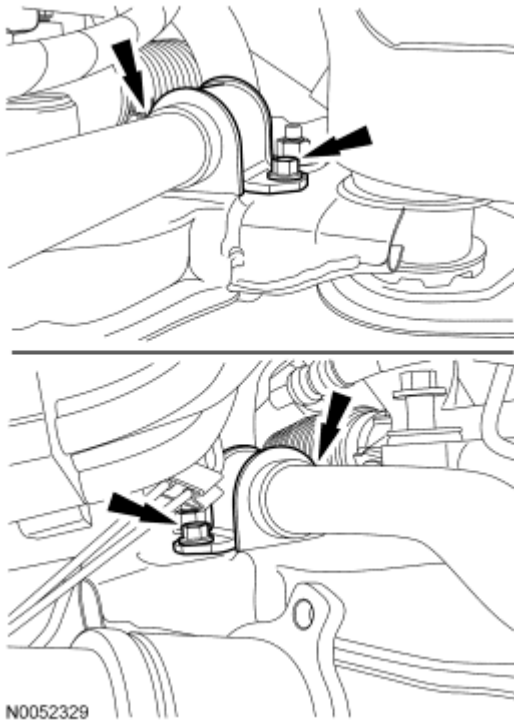
**Fig. 506: Locating Roll Restrictor-To-Transaxle Bracket Plate Bolts**  
Courtesy of FORD MOTOR CO.

26. Install the roll restrictor heat shield and the 2 nuts.
- Tighten to 11 Nm (97 lb-in).



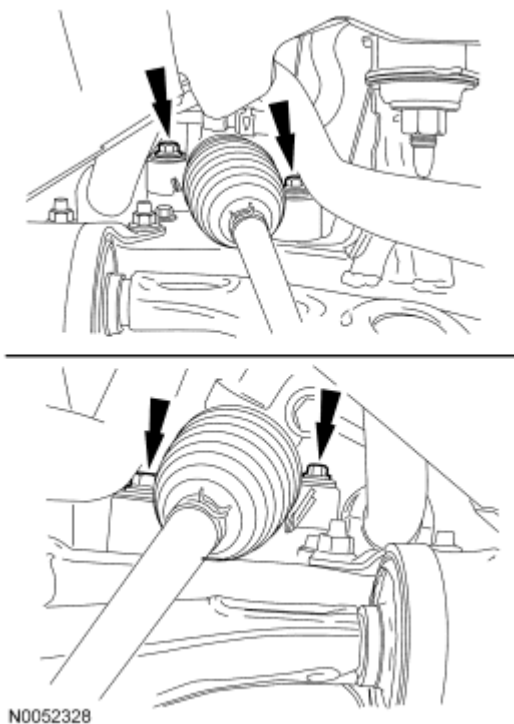
**Fig. 507: Locating Roll Restrictor Heat Shield Nuts**  
Courtesy of FORD MOTOR CO.

27. Position the stabilizer bar in place and install the 4 stabilizer bar bracket bolts.
- Tighten to 48 Nm (35 lb-ft).



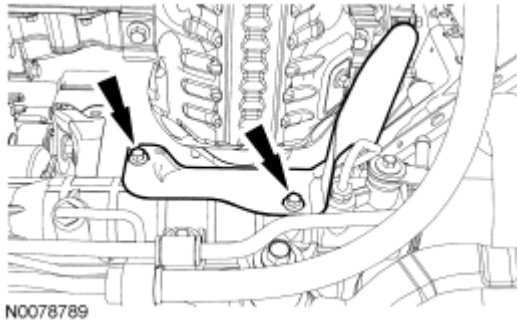
**Fig. 508: Locating Stabilizer Bar & Bolts**  
Courtesy of FORD MOTOR CO.

28. Position the power steering rack in place and install the 4 power steering rack bolts.
- Tighten to 107 Nm (79 lb-ft).



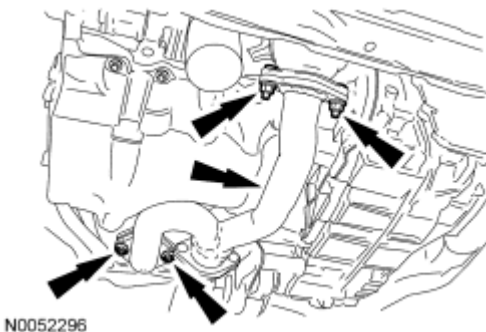
**Fig. 509: Locating Steering Rack Bolts**  
Courtesy of FORD MOTOR CO.

29. Install the steering rack heat shield and the 2 bolts.
- Tighten to 6 Nm (53 lb-in).



**Fig. 510: Locating Power Steering Rack Heat Shield Bolts**  
Courtesy of FORD MOTOR CO.

30. Position the exhaust Y-pipe assembly in place and install the 4 exhaust Y-pipe nuts.
- Tighten to 40 Nm (30 lb-ft).



**Fig. 511: Locating Exhaust Flexible Pipe, Y-Pipe & Nuts**  
Courtesy of FORD MOTOR CO.

31. Install the 2 exhaust hangers and tighten the exhaust clamp.
- Tighten to 40 Nm (30 lb-ft).

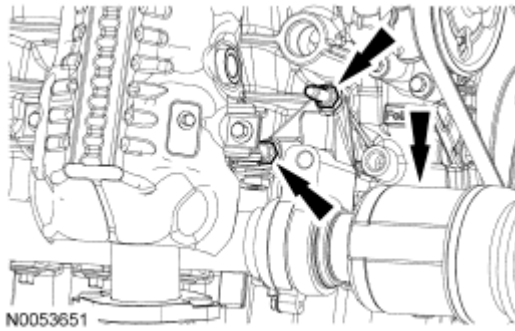




**Fig. 512: Locating Exhaust Flexible Pipe Clamp & Exhaust Hangers**  
Courtesy of FORD MOTOR CO.

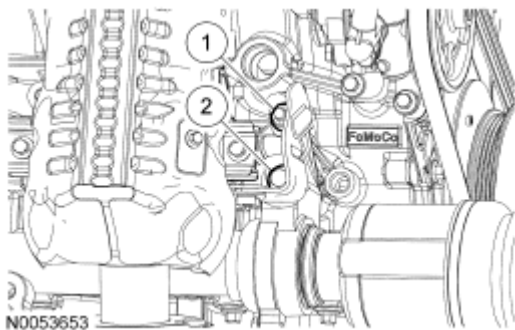
**Front wheel drive (FWD) vehicles**

32. Position the RH halfshaft and intermediate shaft support bracket in the transaxle and in the steering knuckle. Install 1 stud bolt and 1 bolt.
- Tighten to 55 Nm (41 lb-ft).



**Fig. 513: Locating Stud Bolts & RH Halfshaft/Intermediate Shaft Assembly**  
Courtesy of FORD MOTOR CO.

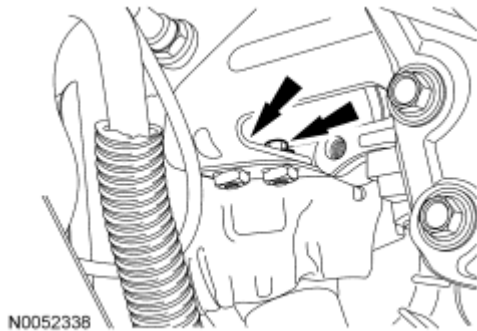
33. Position the catalytic converter support bracket in place and install the bolt and the nut.
1. Tighten the nut to 40 Nm (30 lb-ft).
  2. Tighten the bolt to 55 Nm (41 lb-ft).



**Fig. 514: Locating Catalytic Converter Bracket Bolt & Nut**

Courtesy of FORD MOTOR CO.

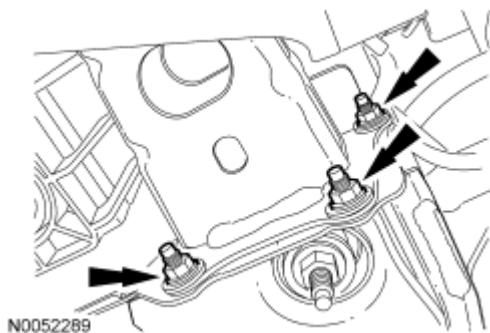
34. Install the 2 RH catalytic converter support bracket bolts.
  - Tighten to 20 Nm (177 lb-in).



**Fig. 515: Locating Catalytic Converter Support Bracket Bolts**  
Courtesy of FORD MOTOR CO.

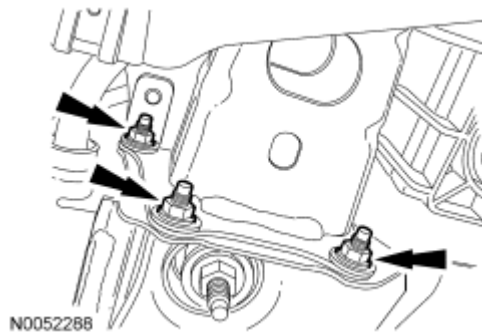
All vehicles

35. Install the LH and RH halfshafts. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
36. Position the lower bumper on the subframe and install the 3 LH lower bumper-to-subframe nuts.
  - Tighten to 10 Nm (89 lb-in).



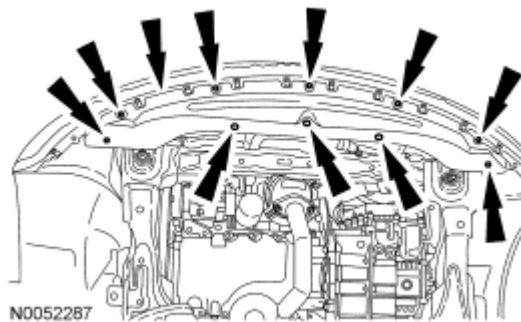
**Fig. 516: Locating LH Subframe-To-Lower Bumper Nuts**  
Courtesy of FORD MOTOR CO.

37. Install the 3 RH lower bumper-to-subframe nuts.
  - Tighten to 10 Nm (89 lb-in).



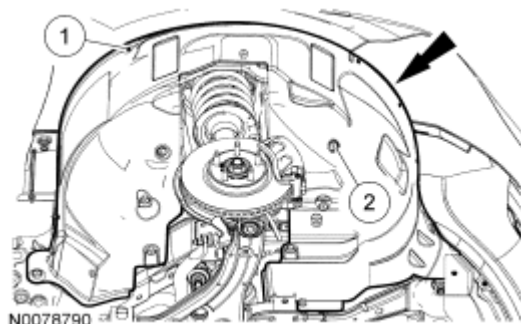
**Fig. 517: Locating RH Subframe-To-Lower Bumper Nuts**  
Courtesy of FORD MOTOR CO.

38. Install the front splash shield and install the 7 screws and the 3 pushpin fasteners.



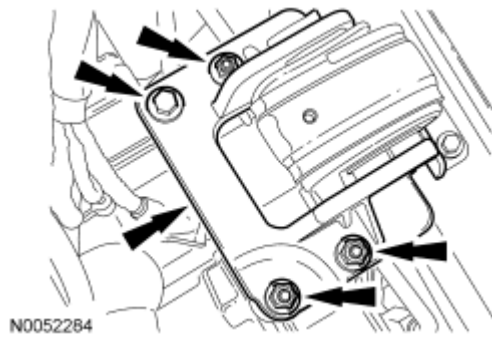
**Fig. 518: Locating Push Pin Fasteners & Front Splash Shield Screws**  
Courtesy of FORD MOTOR CO.

39. Install the RH splash shield.
  1. Install the screws.
  2. Install the pushpin fasteners.



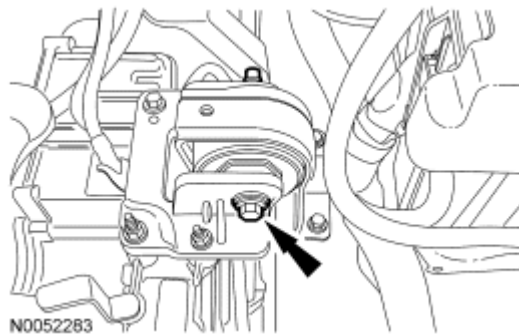
**Fig. 519: Locating Push Pin Fasteners & RH Splash Shield**  
Courtesy of FORD MOTOR CO.

40. Install the transaxle support insulator bracket, install the bolt and the 3 nuts.
  - Tighten to 63 Nm (46 lb-ft).



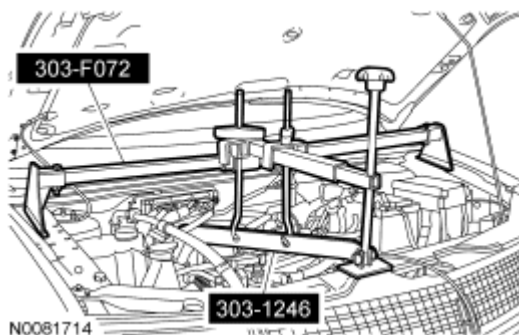
**Fig. 520: Identifying Transaxle Support Insulator Bracket, Nuts & Bolts**  
Courtesy of FORD MOTOR CO.

41. Install the transaxle support insulator through bolt.
  - Tighten to 175 Nm (129 lb-ft).



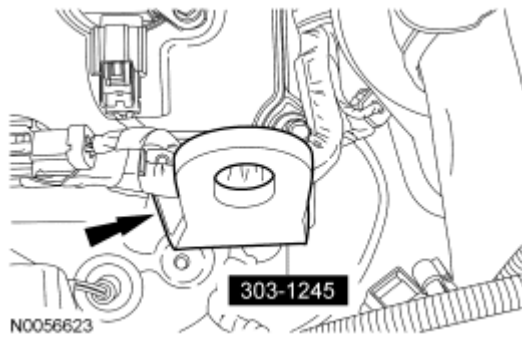
**Fig. 521: Identifying Transaxle Support Insulator Bolt**  
Courtesy of FORD MOTOR CO.

42. Remove the Engine Support Bar and Engine Spreader Bar.



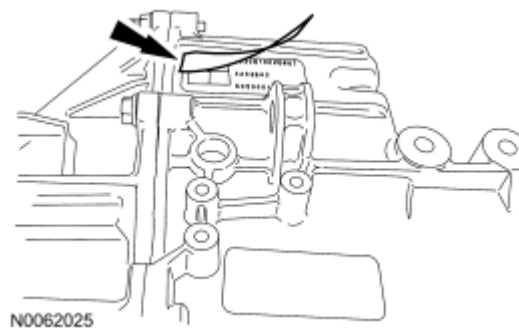
**Fig. 522: Engine Support Bar & Engine Spreader Bar**  
Courtesy of FORD MOTOR CO.

43. Remove the Engine Lift Eye from the LH cylinder head.



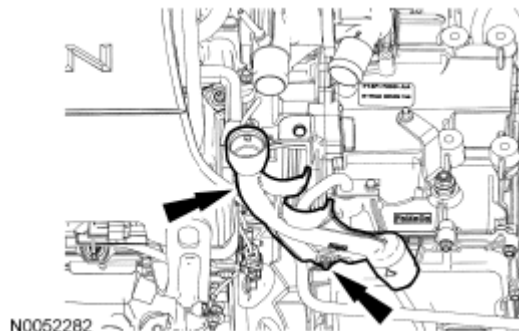
**Fig. 523: Special Tool (303-1245) On LH Cylinder Head**  
Courtesy of FORD MOTOR CO.

44. If a new solenoid body was installed, wipe the surface of the existing solenoid body strategy tag on top of the transaxle case clean and install the new solenoid body strategy tag (supplied with the solenoid body service kit) over it.



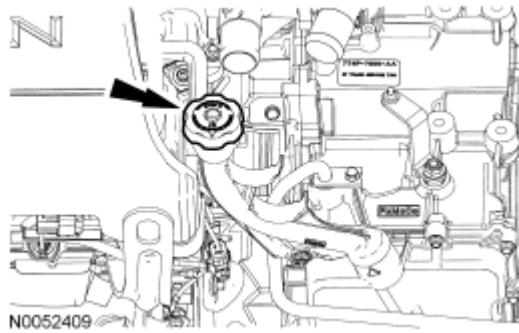
**Fig. 524: Installing New Solenoid Body Strategy Tag Over Existing Solenoid Body Strategy Tag**  
Courtesy of FORD MOTOR CO.

45. Install the transmission fluid filler tube and the nut.
  - Tighten to 11 Nm (97 lb-in).



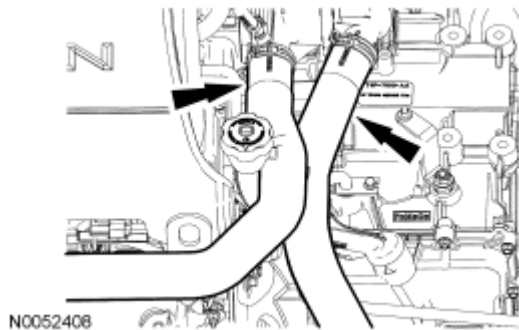
**Fig. 525: Identifying Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

46. Install the transmission fluid level indicator.



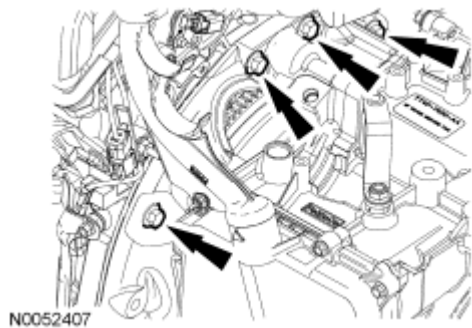
**Fig. 526: Identifying Transmission Fluid Level Indicator**  
Courtesy of FORD MOTOR CO.

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



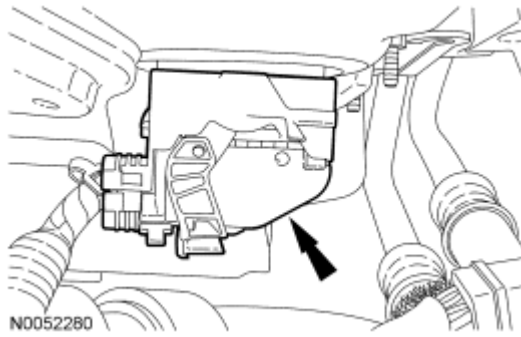
**Fig. 527: Identifying Coolant Hoses From Transmission Fluid Filler Tube**  
Courtesy of FORD MOTOR CO.

48. Install the top 4 torque converter housing bolts.
- Tighten to 48 Nm (35 lb-ft).



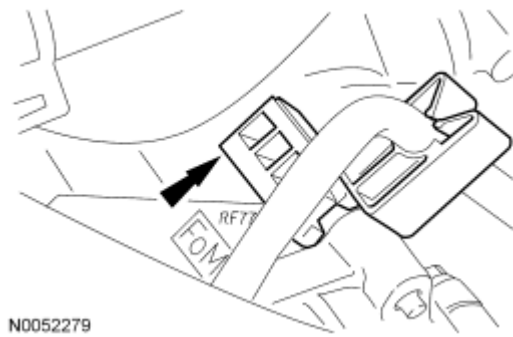
**Fig. 528: Locating Torque Converter Housing Bolts**  
Courtesy of FORD MOTOR CO.

49. Connect the transaxle electrical connector.



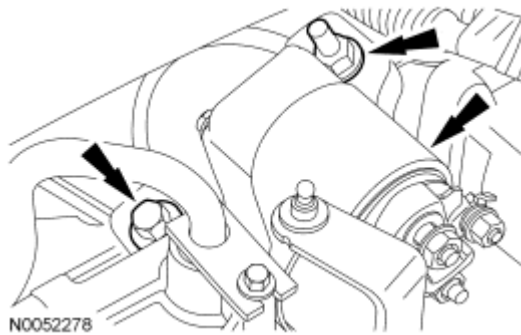
**Fig. 529: Identifying Transaxle Control Electrical Connector**  
Courtesy of FORD MOTOR CO.

50. Position the fuel hose routing clip on the transaxle stud.



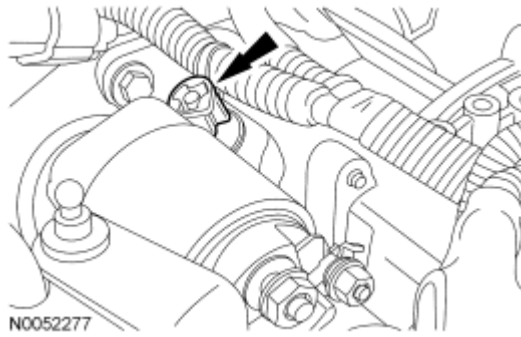
**Fig. 530: Identifying Fuel Hose Routing Clip From Transaxle Stud**  
Courtesy of FORD MOTOR CO.

51. Install the starter, bolt and studbolt.
- Tighten to 26 Nm (19 lb-ft).



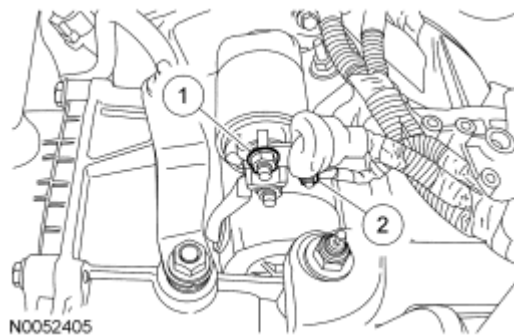
**Fig. 531: Identifying Bolt, Stud Bolt & Starter**  
Courtesy of FORD MOTOR CO.

52. Install the wiring harness fastener on the starter motor studbolt.



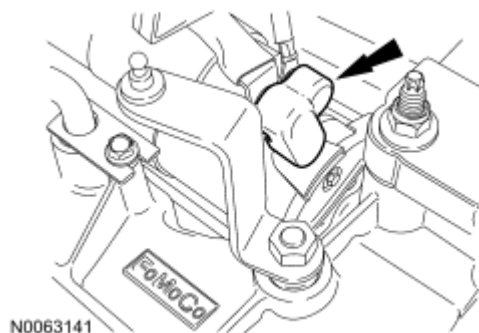
**Fig. 532: Identifying Wiring Harness Retainer From Starter Motor Stud Bolt**  
Courtesy of FORD MOTOR CO.

53. Connect the starter motor terminals and position the starter terminal boot over the battery cable terminal.
1. Tighten to 12 Nm (106 lb-in).
  2. Tighten to 6 Nm (53 lb-in).



**Fig. 533: Identifying Starter Motor Wire Terminals & Nuts**  
Courtesy of FORD MOTOR CO.

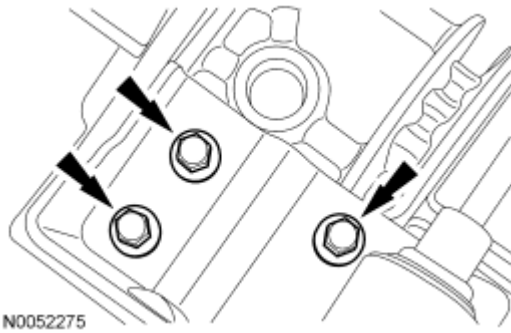
54. Install the starter motor electrical terminal cover.



**Fig. 534: Locating Starter Motor Electrical Terminal Cover**  
Courtesy of FORD MOTOR CO.

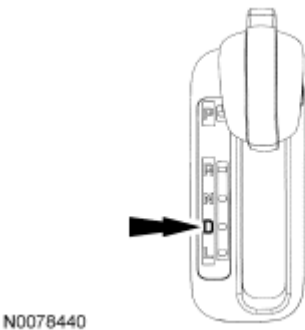
55. Position the selector lever cable and bracket in place and install the 3 bolts.
- Tighten to 12 Nm (106 lb-in).





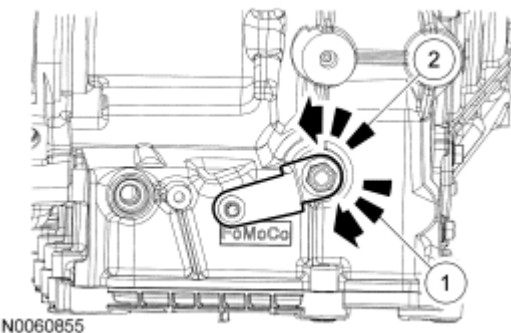
**Fig. 535: Identifying Selector Lever Cable Bracket Bolts**  
Courtesy of FORD MOTOR CO.

56. Place the selector lever in DRIVE.



**Fig. 536: Placing Selector Lever In Drive**  
Courtesy of FORD MOTOR CO.

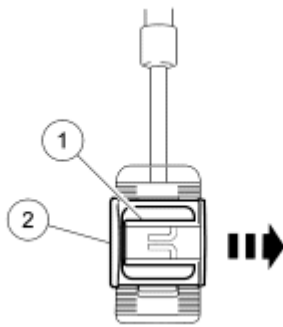
57. Place the manual control lever in DRIVE.
1. Rotate the manual control lever clockwise until it stops.
  2. Rotate the manual control lever counterclockwise one detent until it stops.



**Fig. 537: Rotating Manual Control Lever Clockwise & Counterclockwise**  
Courtesy of FORD MOTOR CO.

58. Unlock the selector lever cable adjuster.
1. Pry the latch up.

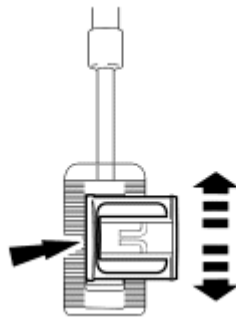
2. Push the lock tab to slide it over.



N0078441

**Fig. 538: Pushing Lock Tab To Slide It Over**  
Courtesy of FORD MOTOR CO.

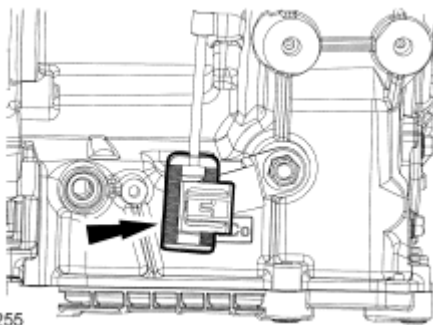
59. Slide the cable end forward or backward to align it with the manual control lever.



N0078459

**Fig. 539: Sliding Cable End Forward Or Backward To Align It With Manual Control Lever**  
Courtesy of FORD MOTOR CO.

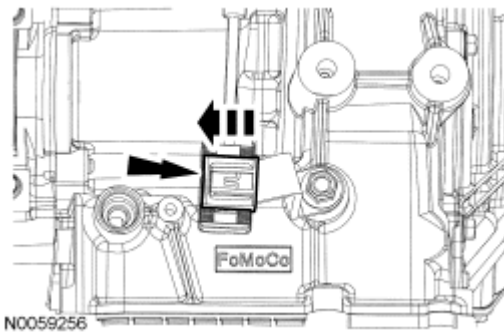
60. With the adjuster locking tab released, connect the selector lever cable end to the manual control lever.



N0059255

**Fig. 540: Connecting Selector Lever Cable End To Manual Lever**  
Courtesy of FORD MOTOR CO.

61. Slide the release tab back to lock the adjuster.



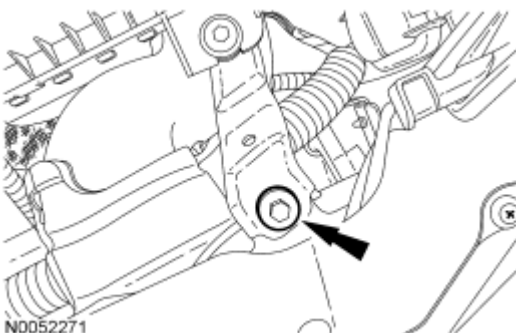
**Fig. 541: Sliding Release Tab Back To Lock Adjuster**  
Courtesy of FORD MOTOR CO.

62. Install the upper intake manifold. For additional information, refer to **ENGINE - 3.5L** article.
63. Install the battery tray.
  1. Install the 3 bolts.
    - Tighten to 10 Nm (89 lb-in).
  2. Connect the wiring harness fasteners to the battery tray.



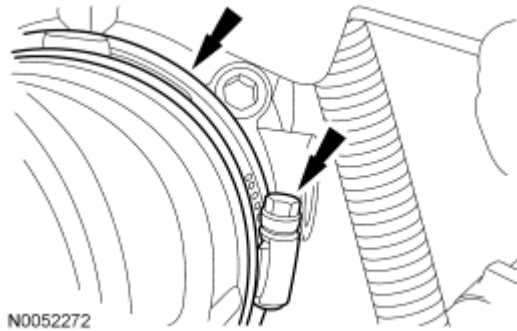
**Fig. 542: Identifying Wiring Harness Fasteners, Battery Tray & Bolts**  
Courtesy of FORD MOTOR CO.

64. Install the battery. For additional information, refer to **BATTERY, MOUNTING & CABLES** article.
65. Position the Air Cleaner (ACL) assembly in place and install the bolt.
  - Tighten to 11 Nm (97 lb-in).



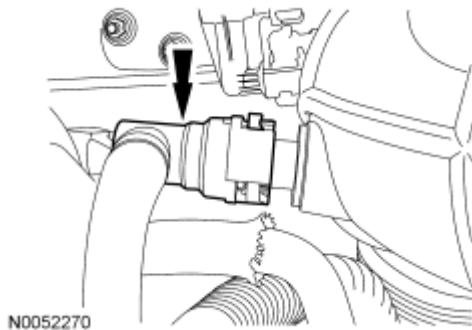
**Fig. 543: Locating Air Cleaner Assembly Bracket Bolt**  
Courtesy of FORD MOTOR CO.

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



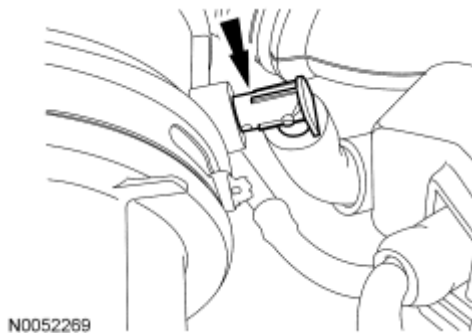
**Fig. 544: Locating Air Cleaner Outlet Pipe Clamp**  
Courtesy of FORD MOTOR CO.

67. Connect the engine breather to the ACL assembly.



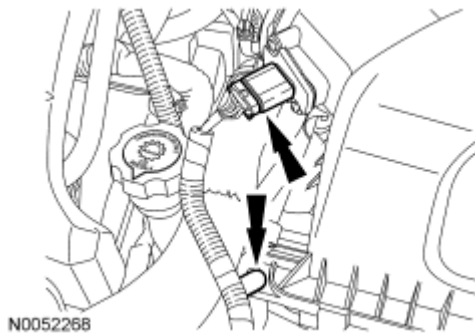
**Fig. 545: Locating Engine Breather**  
Courtesy of FORD MOTOR CO.

68. Connect the brake booster vacuum hose to the ACL assembly.



**Fig. 546: Locating Brake Booster Vacuum Hose**  
Courtesy of FORD MOTOR CO.

69. Connect the MAF sensor electrical connector and connect the electrical harness fastener.



**Fig. 547: Locating Mass Air Flow (MAF) Sensor Electrical Connector & Wiring Harness Fastener**  
Courtesy of FORD MOTOR CO.

70. Fill with clean transmission fluid to the correct level.
71. If a new solenoid body is installed, the solenoid body strategy and solenoid body identification will need to be updated. Refer to **Solenoid Body Strategy**.
72. If a replacement transaxle assembly is being installed or a new solenoid body is installed, the PCM will have to be reflashed with a new solenoid body strategy and identification data file. For additional information, refer to **Solenoid Body Strategy**.